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A CONCEPTUAL FRAMEWORK FOR DEVELOPING AND IMPLEMENTING A PROGRAM FOR GEOGRAPHIC EDUCATION FOR SELF-RELIANCE IN TANZANIAN SECONDARY SCHOOLS

BY

© FREDERICK EDWARD MBEO

A THESIS
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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled "A Conceptual Framework for Developing and Implementing a Program for Geographic Education for Self-Reliance in Tanzanian Secondary Schools", submitted by Frederick Edward Mbeo in partial fulfilment of the requirements for the degree of Master of Education.

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ABSTRACT

This study was motivated by the awareness that the aims of education for self-reliance which were suggested in 1967 and which are still to be achieved had hardly been realized in the development and implementation of a program of geographic education for self-reliance in Tanzanian secondary schools. The Musoma resolution of November, 1974 has also pointed out a general insignificant shift in the educational deliberation since the promulgation of the "Education for Self-Reliance".

Upon diagnosis of the discrepancy between the aims of education and the prevailing and past secondary school geography syllabi and the factors that might have caused this discrepancy, it was found that although many of these factors might have interplayed to hinder educational change, the first and foremost one was our lack of understanding the relationship between the aims of education for self-reliance, the principles of program development, and the field of geography. For this reason, a conceptual framework intended to establish an understanding of this relationship was suggested.

Basing on this framework, five problematic areas were tackled. These included the source(s) of instructional content; the criteria for selecting the instructional content; the criteria for organizing the instructional content; the sort of learning and teaching activities that would be most relevent to education for self-reliance, the integration of the school with the community included; and the definitions, goal, and roles of evaluation.

For each of these themes, an attempt was made to clarify the challenge of the philosophy of education for self-reliance and some of the key ideas and concepts in education and in geography. Some problems pertaining to these issues were raised and some avenues to future improvement of geographic education for self-reliance in secondary schools were suggested.

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CHAPTER I

INTRODUCTION

I. THE CHALLENGE OF EDUCATION FOR SELF-RELIANCE

February, 1967 saw the promulgation of the "Arusha Declaration", a document which made explicit the ideology that Tanzania had to follow in order to build a democratic socialist state. This was a necessary step since the nation had to clearly specify its overall philosophy which had to guide choice and action in all facets of national development. As President Nyerere (1968) puts it, 'Only when we are clear about the kind of society we are trying to build can we design our educational service to serve our goals' (p. 272).

An outgrowth of "Arusha Declaration" is an educational document, the "Education for Self-Reliance" published in 1967, which establishes the present philosophy of education for Tanzanian society. The document analyzes the system and attitudes to education as they had evolved in Tanganyika and demands an educational revolution. In effect, the document presents a challenge to teachers and others concerned with education to re-appraise the existing school programs and, if need be, to overhaul them and make them truly relevant to a society aspiring to democratic socialism and development.

Briefly, the societal aims of education for self-reliance are enunciated thus (Nyerere, 1968):

> 'The purpose (of education) is to transmit from one generation to the next the acumulated wisdom and knowledge of the society and prepare the young people for their future membership of the society and their active participation in its maintainance or development' (p. 268).

Thus, education for self-reliance has a two-fold goal, one social and the other vocational (Nyerere, 1968):

> 'It has to foster the social goals of living together, and working together, for the common good' by inculcating 'a sense of commitment to the total community', and emphasizing 'co-operative endeavour (p. 273). It has also to foster the vocational goals of preparing 'young people for the work they will be called upon to do in the society which exists in Tanzania - a rural society where improvement will depend largely upon the efforts of the people in agriculture and village development', and as well as for 'their responsibilities as free workers and citizens in a free and democratic society, albeit a largely rural society' (p. 274).

In order to foster both the social and vocational aims of education, 'The education provided must encourage the development in each citizen of three things (Nyerere, 1968):

> an enquiring mind; an ability to learn from what others do, and reject or adopt it to his own needs; and a basic confidence in his own position as a free and equal member of the society, who values others and is valued by them for what he does and not for what he obtains' (p. 274).

In connection with the process of developing and implementing a program for secondary schools, the nature of the challenge of education for self-reliance can be ascertained by considering its major demands.

First, education for self-reliance calls for the clarification and improvement of the sources of instructional content. For, 'our present system encourages school pupils in the idea that all knowledge which is worthwhile is acquired from books or from "educated people". The knowledge and wisdom of other old people is despised, and they themselves regarded as being ignorant and of no account'. As a result, 'Everything we do stresses book learning, and underestimates the value of our society of traditional knowledge and the wisdom which is often acquired by intelligent men and women as they experience life, even without their being able to read at all' (Nyerere, 1968, p. 277).

Second, education for self-reliance demands a change in 'the content of the curriculum itself' because 'education is such as to divorce its participants from the society it is supposed to be preparing them for. This is particularly true of secondary schools' (Nyerere, 1968, p. 276). Instructional content tends to be irrelevant because it still reflects the undesirable characteristics of the colonial past which intended 'to inculcate the values of the colonial state' (Nyerere, 1968, p. 269). For these reasons, and because secondary school education 'is needed by the few for the service of the many' education 'must prepare people for life and service in the villages and rural areas of this country' (Nyerere, 1968, p. 281). 'At post-primary schools, teaching must be the provision of knowledge, skills and attitudes which will serve the student when he or she lives and works in a developing and changing socialist state' (Nyerere, 1968, p. 282). Education for self-reliance calls for selecting and organizing instructional content which is relevant to the society and the learners. This implies that we also need to examine critically the rationale upon which selection and organization of instructional content are based.

Third, education for self-reliance demands the re-examination of the selection and organization of instructional activities, change in the social interaction between the teacher and the student and between all members of the school, and the integration of schools with the community. In particular, students have to 'learn by doing' (Nyerere, 1968, p. 284) and should be able to integrate theory with practice through inquiry or problem solving and decision making approaches rather than by rote, for the education system should not produce 'robots who work hard but never question what the leaders are doing and saying' (Nyerere, 1968, p. 274). Education should not 'produce passive' peasants and workers 'who simply carry out plans or directions received from above' (Nyerere, 1968, p. 274). Education must produce citizens who 'have to be able to think for themselves, to make judgements on all the issues affecting them; they have to be able to interpret the decisions made through the democratic institutions of our society, and to implement them in the light of the peculiar local circumstances where they happen to live' (Nyerere, 1968, p. 274).

Schools must become communities 'which practice the precept of self-reliance. The teachers, workers and pupils together must be members of a social unit in the same way as parents, relatives, and children are the family social unit. There must be the same relationship between pupils and teachers within the school community as there is between children and parents in the village. This means that all schools, but especially secondary schools must be economic communities as well as social and educational communities' (Nyerere, 1968, p. 283).

Instructional activities and interpersonal relationships which education for self-reliance demands are important for both vocational and social aspects of education. The activities have to permit student's autonomy in learning: 'There will be philosophies and policies approved by our society which citizens should consider and apply in the light of their own thinking and experience. But the educational system of Tanzania would not be serving the interests of a democratic socialist society if it tried to stop people from thinking about the teachings, policies or the beliefs of leaders, either past or present. Only free people conscious of their worth and their equality can build a free society' (Nyerere, 1968, p. 275). The demanded interpersonal and intergroup relationships suggest a change in the instructional climate.

Fourth, education for self-reliance demands the re-examination of the purpose of evaluation and the employment of alternative procedures of evaluation. We have to 'think about whether some form of examination is an appropriate way of closing an education phase' (Nyerere, 1968, p. 282). In order to prepare young people for the realities and needs of Tanzania a radical change has to be made in many existing community attitudes. This partly requires that examinations have to be down-graded in Government public esteems because they generally 'assess a person's ability to learn facts and present them on demand within a time period. They do not always succeed in assessing a power to reason and they certainly do not assess character or willingness to serve' (Nyerere, 1968, p. 281).

Education for self-reliance emphasizes the need to prepare young people for the future: 'Our education must therefore include a sense of commitment to the total community, and help the pupils to accept the values appropriate to our kind of future, not those appropriate to our colonial past' (Nyerere, 1968, p. 273).

II. POST-EDUCATION FOR SELF-RELIANCE SITUATION OF GEOGRAPHY SYLLABUS DEVELOPMENT

How far has the challenge of education for self-reliance been tackled in the development of geography syllabus for secondary education since 1967? What factors have tended to discourage educational change with respect to geographic education for self-reliance in secondary schools?

Lack of the knowledge base or concrete data about new educational ideas is among the major factors which have tended to hinder educational change. Few ideas have been backed by solid research and studies and documented practice. Research and experimentation have hardly found room and direction in the entire process of educational planning, administration and instruction. Although we know that there are some things wrong with education, it is difficult to account for or to evaluate, on the basis of findings, the real discrepancy that we have to rectify. Educational discussions have largely remained theoretical rather than practical. Sometimes theorization has inevitably incorporated some research findings and studies done in other countries without clear knowledge of the assumptions and conditions under which they were derived or performed. As Ingram (1966, p. 44) points out, without relevant and extensive research and studies, it is difficult for educators to really know the merits of a new practice, or to become professionally committed to it for they are likely to work in the dark.

The effects of the lack of educational research inevitably extend to this study in that the statement on the past and present syllabus development situation would be more informative and less presumptuous if this could be a review of literature on the trends of geographic education for self-reliance in our secondary schools. Thus, much of the account on this issue can hardly escape treatment in terms of hypotheses, hunches and personal experiences rather than findings.

Lema (Adams, Mmari and Vella, 1972) holds the following general impression of syllabus development situation:

> 'improvement, reform, and modernization in teacher education have been topics about which a lot has been said and written but very little has been done. Today's programmes for teacher education are much the same as they were twelve years ago. Most of our programmes for teacher education operate without any prior comprehensive analysis and assessment of our needs and objectives. Very few of them are based upon meaningful and practical role of the learner, the changing society in Africa and above all, the kinds of skills and attitudes that every educator needs if he is to grow as a teacher! And because 'any discussion of strategy in educational change, whether that change is in elementary, secondary or teacher education, or in any other educational areas' suffers from 'the tendency to try to keep it rather simple by applying hurriedly considered modifications, the result is nearly always uninspiring. The programmes remain the same or the change is not significant enough to leave a lasting impression on the old system' (p. 66-67).

Tunginie (Adams, Mmari and Vella, 1972) is of the following opinion:

> 'Existing formal systems of education, which in most cases is still traditional, seem to me to have been unable to meet our demands not so much from the point of view of quantity as from the point of view of quality in terms of our new values. What we need in terms of high-level manpower today are people who are not only intellectually capable, but also very well-tempered and committed to the values of our present-day societies, and, above all, highly motivated for production' (p. 19). 'We are compelled to examine closely the quality of the kind of education we are giving in terms of

> relevance and usefulness. That we are giving education that is examination- and certificate-oriented and really nothing else cannot be denied. We must now change' (p. 20).

These statements highlight the general picture of the recent situation of syllabus development. An analysis of the present "National Provisional Geography Syllabus" for Forms 1-4 and Forms 5-6 (Appendix I) reveals that the process of developing a syllabus has been limited to a mere listing of topics to be taught. A comparison of this syllabus with the past ones (Appendix I) indicates an insignificant difference in their content and process. Syllabus development process has for years remained a mere act of changing topics by "addition-reduction-substitution" process guided by inadequate and sometimes unclear selection and organizational criteria. Thus, for Forms 1-4 syllabus Asia is reduced to China; Europe is reduced to the Rhine Lands; America is reduced to North America and this in turn substitutes Australia and New Zealand; more content is added to the Regional Geography of Africa in which Tanzania is subsumed within the study of East Africa. Besides a duplication of the content of its Regional Geography, the Forms 5-6 syllabus remains virtually the same as before.

A comparison of the aims of education and the goals of the syllabus with the topics listed shows the lack of congruence between what is actually prescribed and what should have been taught and learned had the philosophy of education for self-reliance been appropriately operationalized. The first part of Forms 1-4 syllabus states what actually should be called "goals" although the term "objective" is used. When these goals are compared to the topics in the syllabus it becomes evident that this syllabus alienates the learners from the mainstream of social, economic and political realities of their society. The content has heavily focused on the coverage of world countries and their problems with less regard to the promised goals of helping the learner to become aware of his immediate environment and to acquire appropriate knowledge, skills and attitudes with which to interpret that environment. But to divorce content from the realities of the learner's society is to deprive him of the opportunity to experience relevant issues and problems which would form a firm foundation upon which relevant learnings on other countries could be easily understood. Alienation of content is an indication of the misconception of the principle of transfer and the need to learn from what others do; and it means socializing students of our society through wrong geographic content. Alienation of content might have resulted in an insignificant change of the values and attitudes of teachers and students towards societal aspirations.

The syllabus is dominated by traditional Regional Geography of the World or "the Geography of the Globe". The scope and sequence of the listed countries are determined by the assumption of "a concentric curriculum": that learners should proceed from "known to unknown". Consequently, geography is still viewed as an inventory type of study of the world, country by country, and continent by continent. Thus starting with East Africa, the study proceeds in this fashion rather than developing the methods of understanding the complexity and variety of the world by referring to whatever areas are appropriate to the intended outcomes and activities. This sort of study does not, unfortunately, focus on student learning, rather it tends to over-emphasize horizontal coverage of information, places, names, dates, facts and figures in unrelated manner and thus results in what is termed "capes-and-bays geographic education"; that is, geographic learning with no consideration of organizing content around a conceptual scheme which would permit learners to identify and grasp readily the key geographic concepts and principles in a related way and which would thus facilitate the learner's process of concept formation. Capes-and-bays regional geography of the globe 'has to be associated with the old tradition in geographic education, that of acquiring discrete items of information about the world without the accompaniment of an intellectual framework. It is a persistent tradition, too.' (Gunn, 1970, p. 42).

Capes-and-bays tradition may have been reinforced by the practice of "country-listing" rather than "intended learning outcome listing". Indeed, virtually no syllabus goals have been stated for Forms 5-6 course. Instead, the syllabus begins with inculcating in the student and the teacher examination-geared expectations and calling for "banking" of knowledge: 'Candidates will be expected in answering questions.' 'Questions will be set to encourage them to use their knowledge' (Appendix I, 1973). The practice of listing countries and topics under each country rather than stating the intents of the program for each form level suggests the existence of problems of understanding and locating 'the organizing concepts which one may use daily to encounter and organize reality' (Bruce, 1965, p. 20).

It seems that geogrpahy is still narrowly conceptualized as a single discipline rather than a way of thinking, selecting, and organizing learnings from a naturally integrated man's real environment. The nature of the syllabus content bears strong beliefs in the geographic discipline as the only source of content - the "disciplined knowledge" - and as the major determinant of syllabus orientation. Exclusive reliance on the geographic discipline as a source of content might have restrained the need to refine and improve the sources of syllabus content and might have reinforced alienation of learners through exclusive reliance on imported textbooks and other source materials, for despite the inadequate selection procedures, most materials become obsolete even before they reach schools. There is a direct relationship between the countries selected and the nature of instructional resources, their availability and their impact on the learners.

Exclusive dependence on imported instructional materials is likely to have resulted in schools being ill-equipped because it might have induced lack of activity and experimentation in utilizing our environment to design appropriate materials for our learners. Hardly any attempt has been made to develop a variety of problem solving and experientially-based instructional materials which would permit choice and flexibility of geographic and related data that learners could manipulate in a way conducive to meaningful learning, that is, materials which would force the learner to take an active role in his own learning. Having conducted a survey of audio-visual equipment in Tanzanian schools, Jengo (1972) came to the following conclusion:

> 'While strategies for developing and implementing a complete socialist educational system have been widely discussed in Tanzania in recent years, strategies for rational utilization of educational media have not. This relative lack of attention has its roots in the present structure of our curricula in schools and colleges' (p. 135). Even the available 'new educational media are used haphazardly. This is because the media are considered separately or treated out of the context of curriculum, the school environment and psychological consideration' (p. 136).

Geography teaching has also hardly engaged students in preparing instructional materials.

Another obvious characteristic of the syllabus is the emphasis on the traditional dichotomy between Physical Geography and Human Geography. Subsection (b) and (c) of Section B of Forms 1-4 syllabus and Paper I of Forms 5-6 syllabus treat physical geography as separate topics. This dualism in geographic education is an indication that "environmental determinism" - the view that stresses the overriding influence in human life and activity of the physical environment (Murphy, 1973, pp. 56-59) - still re-echoes in the secondary school syllabus. To the environmentalists, geography means a study of how nature conditions or even determines man's behaviour and activity. It is in the light of this view that William Morris Davis (Brock, 1965) writes:

> "In its physical part geography examines all natural features of the earth's surface; in its human part geography considers the effect of these natural features on man and his activities' (p. 19).

In this conception, physical geography studies an "object", the earth's surface, and human geography investigates how physical factors influence man's destiny. The relationship between physical attributes and man are seen as one way rather than transactional in nature. A separate treatment of physical geography in the syllabus suggests the persistence of this long-standing habit of traditional geographers to divide the discipline into two superficially distinct geographies. Reference to the 1947 and 1955 syllabi (Appendix I) reveals that this dichotomy has been inherited from the past practices of syllabus development in which geography was at times equated with geology and ecological variables were not viewed as human valuable resources that are practically inseparable from man's cultural environment and as necessary means to aid his development.

Certainly, environmental determinism is an obsolete theory and as Murphy (1973, p. 59) points out, "determinism" as an approach has been replaced by "possibilism", which assumes that man has a large degree of choice even though the environment may set certain limits on what he can profitably do.

Although objectives on man's transaction with his environment should be a necessary feature of geographic education, the operational use of such a broad concept is quite limited when it is at the most general level. It needs to be broken down into smaller levels of objectives before it can be used as a basis for instructional planning. As Gunn (1970) puts it, 'Man-land understandings can best be studied in the student's immediate environment, about which he already has a detailed knowledge. Transfer can quickly be made from very general objectives to the specific details which they subsume' (p. 42). The preoccupation with World Geography and the dichotomy between Physical and Human Geography might have induced a simplistic consideration of humanistic input into the geography course. For, even the contents of the syllabus suggests a knowledge-specific rather than a value-and-process orientation.

Emphasis on knowledge category might have also rested on the common misconception that knowledge about something results in valuing it. But research has shown that 'student's attitudes toward something cannot be inferred from his knowing of it' (Carswell, 1970, p. 109). Thus a knowledge or information-laden program should inadequately succeed to effect a change in the values and attitudes of the learner. And since affective-process learning is a key prerequisite to effective problem-solving and decision making, emphasis on information learning might have incapacitated students from performing such activities efficiently.

Alienation of content, capes-and-bays geography, lack of instructional materials, improper use of available materials, country listing and other characteristics of syllabus development situation must have interplayed to hinder the efforts of teaching by inquiry-based techniques. For, the persistence of these elements correlate with dominant conception of learners as passive and receiving, preoccupation with memorization, emphasis on static conditions, preoccupation with factual detail and tendency to team up with history and geology (Gunn, 1970, p. 41). For students to retain a general knowledge of the world it is necessary that they acquire the knowledge in a meaningful way. The knowledge should be retained in a system that aids recall. But capes-and-bays information aided by inadequate and/or inappropriate instructional materials cannot meet this requirement. The frequent absence of meaningful associations and conceptual framework is severe handicap in the light of what we know of the processes of understanding and retention. Under these circumstances, learning by rote and spoon-feeding of students through drilling and cramming of teacher-provided notes and blind copying of paragraphs from textbooks to be memorized for the only purpose of passing capes-and-bays examinations are likely to have been the frequent instructional activities.

The traditional conception and treatment of the geographic discipline might have negatively influenced the type of instructional activities particularly those involving field experiences. Beliefs in "pure" funded knowledge or "solid content" advocated by the academic rationalists - 'the content that is believed to be intellectually rigourous and difficult and that, by its very nature, is presumed to make the necessary strenuous intellectual demands upon students' (Eisner and Vallance, 1974, p. 14), might have prevailed. This view might have been antithetical to the vocational aims of education for self-reliance because practical learning is assumed to be incompatible with the rationale of the academic rationalists who believe that 'To construct a curriculum that includes "practical learning" such as vocational education dilutes the quality of education and robs students of the opportunity to study those subjects that reflect man's enduring quest for meaning' (Eisner and Vallance, p. 12). This philosophy advocates detachment of theory from practice. Indeed, this has for long been the case with our secondary schools.

At least two instances can be cited to illustrate that theory work has continued to dominate the teaching and learning of geography in secondary schools. First, practical geography is not continuously built into the entire duration of the course. Instead, practical geography is listed as a separate topic (Section A of Forms 1-4 syllabus and Paper 3 of Forms 5-6 syllabus in Appendix I, 1973) to be taught and discontinued. Having been "finished", subsequent experiences in practical geography are then chanced occasionally in human and physical geography exercised. Practical geography has remained unintegrated within the entire course of study and has not really helped learners to act continually upon their immediate environment. In fact, as a topic in itself, practical geography has been taught theoretically, and because it is discontinued, even practical skills acquired through occasional practice are soon forgotten because they are never seriously revisited and, hence, reinforced.

Second, the aims of "self-reliance projects" or "social action projects" supposed to become an integral part of classroom experiences, to act as "laboratories" for students to translate theory into practice, to instrument school-community integration, to aid in the inculcation of desired values and attitudes, and to provide alternative sources of instructional content, have been misplaced to a certain degree. Some educators have held a narrow view that education for self-reliance only concerns the outdoor aspects, that is, self-reliant activities after the classroom work, and that it only aims at "education for material self-sufficiency" without any applicability to the classroom instruction of the disciplines of knowledge. Consequently, these activities have hardly been built into the normal in-class time-table with follow-up experiences to ensure that students relate and transfer situations and realize the purpose for these activities. Integration of self-reliance activities has remained artificial and it is possible that the misconception of their purposes may have encouraged some students to regard them as a sort of a hobby. Worse, some students might have developed a dislike for these activities and an attitude that they are time consuming or a burden. Furthermore, self-reliant activities have hardly been integrated with practical geography. Classroom theorization has continued to be divorced from practice and the process of developing practical skills has been minimal.

The forces which have encouraged superficial integration of theory with practice may have discouraged the mutual integration of secondary schools with the life of the real world around them. Unlike Primary Schools and probably Teacher Colleges, but like the University, and because boarding secondary schools still operate, secondary schools may have artificially succeeded to become cultural and community centers to which not only students should come for formal education, but also where adults should meet to teach informal education, to learn and to share new ideas about their community and the rest of the world. Theorizing education coupled with the rejection of practical learning might have encouraged secondary schools to divorce themselves from the communities to which they belong. And, emphasis on academic rationalism seems to be one cause for elitist, arrogant and individualistic attitudes. Certainly, some secondary schools have succeeded in integrating with the community and generally elitist attitudes and feelings of superiority over other segments of the population have reduced over time. However, forces within the schools and those emanating from the homes and the community at large still work to reinforce nonegalitarian tendencies (Mbilinyi, 1973; Bacchus, 1972). A need exists to investigate these forces and to suggest frameworks that can guide effective integration of secondary schools with the community.

Lack of research and studies may partly be attributed to the inadequacy of an institutionalized "change-agent" function in the educational institutions and generally in our educational system. There is a lack of people or organized bodies - departments or research bureaus - which have as their major function the advocacy for and introduction of innovations into practice, and through which individuals could advance their innovations at district, regional and national levels. However, at national level this function is presently handled by the Institute of Education at the University of Dar-es-Salaam and the Directorate of Curriculum and Examinations of the Ministry of National Education; there may be a number of others at this level. But hardly any educational change agent function exists at district and regional levels with respect to secondary school education and in the sense this function is defined here. Ministerial offices in the Regions have been confined to administrative tasks rather than innovative research and experimentation. Research performed at these levels usually comes from the top, that is, the Ministry or the University. One can, of course, note the emerging collaborative mode of syllabus development in several instances. But with respect to secondary school education, co-operative endeavour in educational research seems to be limited by the emphasis on a "top-down" decision making model. Unlike Primary School education, secondary school syllabus has remained centralized. Indeed, Lema (1973) argues for a top-down mode of program development when he states that 'in our existing manpower situation, curriculum planning be a centralized activity, based upon a national curriculum development center. To pretend that curriculum development can be effectively undertaken by full time tutors and teachers, working up country in their spare time with no supporting facilities, is mere self-deception' (p. 52). But this makes decisions on content and process to be made out of the context of the learners and instruction. The centralization model tends to overlook the "proximity principle" that 'In order that curriculum activities develop effectively, decisions should be made as close as possible to the point of implementation. The motivation and vitality of the persons involved with the development of the curriculum rises sharply with their sense of identity with the activity undertaken. The things "we" do are much more vital than the things "they" require us to do' (Stewart, 1968, pp. 29-30).

The aims of the Ministry and the Institute recognize the significance of "action" research 'utilized as the principal means for developing a school curriculum' because it enables 'teachers to study what they are doing, to experiment with ideas that seem to them to be more promising and to find out if they are better. It is a search for new ways and means of attaining the object of education, based on the assumption that teachers are the vital agents of curriculum development. It is they who actually teach, and it is they who ultimately determine the learning experiences of their charges' (Auger, 1972, p. 26). True, this is the sort of task teachers have to perform if they are not to be deprofessionalized and incapacitated in facilitating student learning. However, the bibliography on educational research and studies done (Auger, 1972, pp. 31-33) indicates that action research has been for the University rather than for teachers in the field. None of the research listed has been done by teachers in the secondary and primary schools and very few of them have addressed themselves to the problem and improvement of program development and classroom instruction.

Secondary schools have lacked mobilization and motivation to make innovative research and experimentation. Enough effort has not been made to find ways by which creative teachers and students could explore problems pertaining to student learning. It is as if we still believe that teachers and students cannot adequately conduct research and fund knowledge. This is, the writer believes, a wrong and indeed a selfish attitude. Given opportunity and proper education in which research techniques and procedures are part of the instructional programs, teachers and students together could ask themselves the right questions and conduct research to solve them. A need exists to institutionalize the process of innovation and make it a part of educational management at school, district, regional and national levels and in all facets of the entire educational enterprise in the country. Research and innovation are likely to remain at the top if teachers and students will become mere receivers, selectors and users of specialist findings and products.

Lema (1973) thinks that 'most of the teachers we have in many of our schools are average teachers; indeed many are below average' and that 'Many of important ventures in education have failed due to the inability of the mediocre teachers to apply them in the classroom. This sort of thing can be avoided in future if teacher education is given proper attention' (p. 6). By "average" Lema probably means that most teachers are poorly prepared for the teaching profession and, hence, inefficient participants in program development and instruction. If teachers have really been mediocre participants in these processes, many factors must have interplayed to establish this situation. Prescription of a syllabus and textbooks, frequency and patterns of teacher transfers and staffing, problems of educational planning and cost analysis for economic use of available resources, lack of institutionalized change-agent function at District and Regional levels, an inertia to change are some factors that might have produced an inefficient teacher. An attitude of some educators of viewing education as terminal upon passing a teaching certificate with their consequent "academic bankruptcy" may have also contributed to this problem. But the chief reason for teachers becoming mediocre participants seems to have been the lack of their involvement in program development, research and experimentation of innovations. Teachers might have lacked an opportunity to learn by doing and experiencing the actual process. They might also have lacked appropriate training in the process itself. Therefore, like their learners, some teachers might have lacked an opportunity to translate educational theory into practice or to rethink about the educational models and rationales which they now use but were taught in the past and are thus likely to be obsolete or irrelevant to our philosophy of education.

The involvement of a mediocre participant, a teacher or any other syllabus developer, might have contributed to the misconceptions and misapplication of the aims of education for self-reliance and of the key concepts and principles of program development. Ndunguru (1972) points out that 'at some of the numerous meetings held to discuss the implementation of education for self-reliance, the erroneous impression has been given that by simply following the suggestions contained in the document, it is easy to derive curriculum content, to select appropriate learning experiences and to formulate suitable evaluation procedures' (p. 8). To these misconceptions can be added the use of the concept of "objectives" as used in the first part of Forms 1-4 syllabus. This concept is used synonymously with "goals" of the syllabus. However, later educational thought conceptualizes the terms "aims", "goals" and "objectives" as semantically different concepts which should not be used interchangeably in educational discourse (Bacchus, 1972, pp. 2-6). Content alienation can partly be attributed to the misconception of the terms "relevance" and "applicability" (Appendix I) as criteria for selecting syllabus content.

Traditional practices have tended to minimize the operationalization of the concept of cooperative endeavour. Although student group work has occasionally been used as an instructional technique, teacher's team-work for purposes of syllabus development and instruction in secondary schools has been weakened by the persistent tradition of "teacher invisibility", that is, 'the professional performance of a teacher is relatively independent of his colleagues' and 'the classroom is the teacher's castle' (Ingram, 1966, p. 44). Instructional practices of the individual teacher are never clearly exposed to other teachers for criticism, appraisal, correction and provision of feedback. Teachers design their programs individually from a given national syllabus. There are as many uncoordinated geography programs as teachers, the quality and quantity of each "micro-program" depending on the individual, sometimes, minimal, know-how of the teacher. Students have hardly been involved in the preparation of these programs. The invisibility of a teacher's work makes it difficult to assess what the teacher does to the learners. Lack of cooperation among teachers might have resulted in a lack of utilizing the know-how of the people not directly involved in education - sociologists, doctors, psychologists, anthropologists, engineers - who could help to blaze the trail of new advances in education.

Evaluation of geographic education has consisted of the notion that a teacher gives his students examinations to ascertain the degree to which they have "learned" that geography which the teacher has "taught". For this reason, the importance of examinations has been exaggerated. This notion also implies that it is the student and not the teacher who should be evaluated, the assumption which must have aggravated teacher invisibility which in turn makes it difficult to judge whether teacher's objectives have or have not been irrelevant. The invisibility and independence of teacher performance, coupled with the relative unassessibility of the product, can be a powerful force to maintain the status quo (Ingram, 1966, p. 44). In a teaching and learning situation where the student is the only person who can possibly evaluate the teacher and challenge his autonomy, the conventional wisdom of the teacher is likely to preclude that possibility. The "authority model" of the teacher - that he 'should only deal with subject matter in which he has special expertise - is basically antithetical to open-ended inquiry; perhaps it also is particularly appealing to those requiring the sense of security that derives from being an authority' (Hill, 1970, p. 68).

Since syllabus development process has not focused on evaluation of teacher's performance, our attention has been directed away from the fundamental need to develop the means to evaluate the highly complex relationship between teaching and learning. Furthermore, the feedback from the examinations has not been used for modifying and improving the education we are providing to our learners. In most cases evaluation is never realized during the planning of the micro-programs. Evaluation has been used for administrative purposes rather than for improving student learning. Evaluation has not been comprehensive because assessments have often focused on student's acquisition of knowledge of the cognitive domain and few skills, but not the less tangible attitudinal and process objectives. Nor has evaluation been used for social action which education for self-reliance requires. Teaching for examinations and of the measurable has persisted.

One overall reason why the above situation of syllabus development has prevailed might have been the participants' lack of understanding of the relationship among the aims of education for self-reliance, the principles of program development and instruction, and the field of geography.

III. THE PROBLEM

This study addresses itself to the following general problem: What conceptual framework will display the relationship among the aims of education for self-reliance, the principles of program development and implementation and the study of geography?

IV. THE PURPOSE OF THE STUDY

The purpose of this study is to investigate and suggest a conceptual framework, based on related literature, for establishing the relationship among the aims of education for self-reliance, the principles of program development and implementation and the field of geography. Specifically, the following basic questions are explored:

1. What should be the sources of instructional content?
2. What should be the criteria for selecting the instructional content?
3. What should be the criteria for organizing the selected instructional content?
4. What sort of learning and teaching activities are more conducive to education for self-reliance?
5. What is evaluation and what should be its goal and roles in program development and instruction?

V. NEED FOR THE STUDY

Ndunguru (Adams, Mmari and Vella, 1972) writes:

> 'Even if education is perceived as the conservation and transmission of the cultural heritage, it must have capacity to shift its modus operandi in the face of new conditions, new needs, and the expanding nature of the cultural heritage itself. Without the capacity to change, education will remain hopelessly behind the times, and the gap between what educational institutions are teaching today and what the students will need as adults will gradually increase' (p. 37).

For this shift to take place in geographic education for self-reliance in our secondary schools, for education not to remain encapsulated in a shell of tradition, the present syllabus development situation must change. We need to develop and implement highly teachable geography programs which will challenge the learners intellectually and practically and which will not alienate them from the realities of the society. We need programs that should break the "poor student-poor teaching-poor student" cycle which still characterizes the subject. A program must be developed aimed at developing in the learner the ability to see, to feel, to conceptualize, to act upon real phenomena, to discover and re-discover, to solve problems, to make decisions, to transact with reality in the immediate and remote environments, and thus to enable him to use geographic learnings to make his world more meaningful. We must abandon the reliance on just a mere "coverage" course which teaches about geography of the globe and which is likely to produce "pot-shotters" who ask questions with no connection between them.

This sort of program cannot be achieved by the mere act of changing the topics in the syllabus through addition-reduction-substitution process. For, this does not change all that goes under the name "education", nor does it establish the complex relationships between the components of a program. One major tool needed to aid educational change in Tanzania is educational research and studies which we have very much lacked. This study tries to meet one such need: it suggests a conceptual framework which is aimed at helping educators to understand important matters pertaining to geographic education for self-reliance in Tanzanian secondary schools. We need to understand how to conduct an educational process that facilitates student learning, for, as Blaney (1974) puts it, 'It is to serve this purpose that society maintains schools' (p. 3).

Action research (Auger, 1972) is based on the assumptions of teacher-based-and-interactional rather than top-down approaches to program development. It should be realized that even these approaches require the participation of teachers who know what to do and how to do it. Helburn (Patton, 1970, p. 39) warns those who venture into the dimly lit corridors of the curriculum reform that this task is neither easy nor cheap. The inertia is enormous and program development is an art which involves creative synthesis. Therefore, if our emphasis should be on student and teacher involvement in program development, they must understand how to conduct this task. Should this not be the case, teachers will remain mediocre, and, hence, programs, teaching and learning.

This framework is not intended to be rubber-stamped but to provide a basis for asking and tackling educational problems. The significance of a conceptual framework is 'to help see the entire complex of decisions in order to assure that certain considerations are not under-emphasized or other over-emphasized' and to 'aid in continual examination, revision and growth' (Emans, 1968, p. 33). A conceptual framework is needed to guide the understanding of educational theory and practice, but it does not provide every answer to every problem. A conceptual framework at best establishes the relationships among phenomena - in this case, program components - so that one can trace problematic areas and discover solutions to the problems.

VI. A CONCEPTUAL SCHEME FOR THE STUDY

A conceptual framework this study intends to suggest focuses on the process of developing and implementing an instructional program. The term "program" is defined as 'an intended action using selected resources directed toward desired ends'[1]. Program development is a process involving a continuous and cyclic interaction of "ends" and "means" components of an educational program. The ends include "intended learning outcomes" and the means consist of the "resources" and the "intended actions" (Figure 1).

The intended learning outcomes refer to three levels of intents: program "goals", program "sub-goals" and program "objectives". Program goals refer 'to the overall knowledge, skills and attitudes which it is intended that students of an educational institution acquire by the time they have completed their program of studies at that institution' (Bacchus, 1972, p. 5). They are the overall goals of an entire geography program for secondary school education. Program sub-goals refer to goals of a specific program for each form (grade) level of the school system. Program objectives broadly refer to the intentions which are held by individual teachers or a group of teachers, and students working together in a team concerning what they hope to achieve in a particular lesson or project. Ideally, instructional objectives cumulatively make up the sub-goals of a program at a particular form level and together they make up the program goals for a particular institution. The societal aims of education are conceived as the overall philosophy which give direction to every program of the entire desired education in the society. This philosophy transcends educational programs of every educational sub-system.

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[1] Discussion with Doctor T. Aoki, University of Alberta, February, 1974.

Some educators, (Popham and Baker, 1970; Stake, 1972) however, do not make a distinction between these terms. Popham and Baker, for example, admit that terms such as goals, objectives, aims and intents have been used interchangeably throughout their discussion. Yet, they discuss and illustrate the measurable and observable instructional objectives which they call "operationally stated objectives". The philosophical aims, the program goals and the sub-goals, unlike the more specific operational objectives cannot, according to these writers, be operationalized into student performance because they do not include explicit statement of measurable, overt student behaviours. Therefore, these writers actually make a distinction between the more general goals and sub-goals and the more specific objectives. The significance of clarifying these terms lies in the arguments concerning the selection, organization and evaluation of program components.

The resources include the "instrumental content" which refers to any object, event, or action which can call forth desired reactions or responses from the learner and which aid in causing learning. Instrumental content is 'content instrumental to the intended learning outcomes' (Aoki, 1970, p. 6). It is content which a learner acts upon or transacts with during an instructional activity.

The notion of "intended actions" is viewed as including both student's learning experiences (or his learning opportunities) and teacher's instructional strategies, both of which involve a social interaction between the learner with the teacher and these humans with other humans and with the "instructional content". The totality of an educational process includes the transaction between the learner and the "total environment" upon which he acts.

The distinction between learning experiences and teaching strategies is based on the distinction between a learner and a teacher, between "what the learner does" and "what the teacher does" in the teaching and learning processes. This distinction assumes that during instruction the teacher employs certain arrangement of techniques or teaching strategies, his activities, to facilitate student learning. Learning experiences are here viewed as the operations, intellectual, emotional or physical, which the learner employs to transact with the total environment. His interaction with this environment in order to learn may or may not be guided by the teacher and may be either "formal" or "informal". The learner has to activate the environment in order to transform the intents into actual actions if the intents have not to remain a mere blueprint and useless for him.

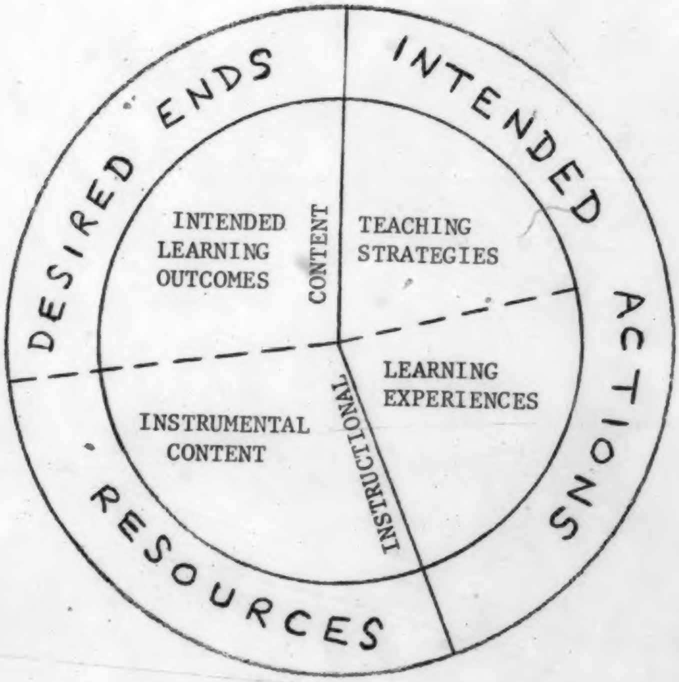

DESIRED ENDS
INTENDED ACTIONS
RESOURCES
INTENDED LEARNING OUTCOMES
CONTENT
TEACHING STRATEGIES
LEARNING EXPERIENCES
INSTRUCTIONAL
INSTRUMENTAL CONTENT

FIGURE 1: A Program Model. After Aoki (1970, p. 12).

Based on this conceptual scheme, the study explores the five problems identified above in relation to the challenge of education for self-reliance. This scheme offers the writer the clearest picture of the complex interrelationships between the components of an instructional program. It provides an uncomplicated, yet fairly adequate conceptualization of the key components of an instructional program. The scheme makes it possible to organize the great body of facts, concepts and principles which are involved in program development and instruction. It facilitates the understanding of other, more complicated models. As an operational and analytical tool, this program model displays a logical sequence by which the relationships among geographic education, the principles of program development and implementation and the aims of education for self-reliance can clearly be investigated and established.

This model, however, is one out of a multitude of others (Emans, 1968; Macdonald, 1975). Like some other models, this scheme includes the components which constitute the program itself rather than the processes which must be performed to avail the program. In other words, unlike other models, this scheme does not indicate the ongoing processes of selecting, organizing, and evaluating program components which are indicated in Figure 1. However, they are these processes that form the core of this study, for the program priorities must continuously be chosen, organized and evaluated.

The decisions to choose and organize priorities from a certain source or sources should be based on appropriate criteria. Chapter two explores the concept of source(s) of instructional content for geographic education for self-reliance. Chapter three and four respectively deal with the decisions of selecting and organizing the instructional content. Chapter five explores the sort of instructional activities which education for self-reliance demands. The controversy surrounding the concept of "learning experiences" is reviewed. The definitions, goal and some roles of evaluation in program development and implementation, and the conclusion of the study form the contents of chapter six.

VII. ASSUMPTIONS OF THE STUDY

The following are the basic assumptions upon which this study is conducted:

1. The processes of program development and implementation are assumed to be ongoing, cyclic and not uni-linear. Although program components are discussed sequentially in the sense that one component follows another, in practice they are interdependent and interrelated and form a cyclic rather than a linear process. Program development and implementation are both systematic and unsystematic processes.
2. Program development process involves effective selection and organization of program components and effective application of evaluation of the sequences and worth of these components.
3. As an operational tool, the proposed conceptual framework will enable decision-makers and students in Education to understand and identify the interrelationships between program components and to develop a secondary school geography program which is compatible with the dominant but dynamic values of Tanzanian society.
4. As an analytical tool, the proposed conceptual framework will enable decision-makers, students in Education and others interested in educational matters to review the current and future literature and research findings of

educational and geographic relevance in the tasks of building and improving an educational program. It is assumed that tentative answers and conclusions to the questions raised in the study will form the basis for further investigation, debate and refinement.

5. The viability of the proposed conceptual framework can only be realized if it is employed as an operational and/or analytical tool.
6. Although research findings and studies done outside Tanzania may have limited generalizability to the country's educational realities, they are referred to mainly on the assumption that they can facilitate the understanding of the nature of some of our problems and the discovery of ways and means of solving them in the light of the current trends in educational theory and practice.

VIII. CONSTRAINTS OF THE STUDY

This study is backed by limited research done in Tanzanian context dealing with the type of problems that have been identified. Furthermore, the study is undertaken outside of the environment of teachers, students, and others involved in education in Tanzania. Lack of proximity to the environment in which education for self-reliance is being implemented may introduce a degree of discrepancy between the situation of "program" development and instruction now being undertaken in the secondary schools and the "syllabus" development and implementation as analyzed in this study.

Any conceptual framework is a representation of someone else's images of the phenomena that it includes. Since such images depend on the observer's unique frame of reference and his value system, any conceptual framework cannot be absolute truth. Any framework suffers from distortions of reality. It thus cannot be mandatory but suggestive.

CHAPTER II

SOURCES OF INSTRUCTIONAL CONTENT

I. PREVIOUS VIEWS ON THE CONCEPT OF SOURCES

Education for self-reliance demands the clarification and improvement of the sources of instructional content. The term "sources" is among the controversial and confusing concepts in educational literature. Indeed, the confusion of tongue which has beset curriculum workers causes Johnson (1968) to state that the vocabulary is still one of the chief problems in curriculum theory. Even the term "curriculum" is itself 'a weasel-word whose multiplicity of assigned meanings often hinder rather than promote communication among discussants' (Aoki, 1970, p. 1) and 'perhaps a wrong word' (Bruner, 1966, p. 35). Like "curriculum", the concept of source(s) still presents problems of communicating educational discourse. This chapter is an attempt to clarify the concept of source or sources of instructional content as the writer sees it and to suggest how geography can function as a source of content.

Most discussions hold the view that the nature of the learner, his needs and/or interests; the nature of the society, its values and/or problems; and the nature of the discipline are sources of instructional content. This school of thought essentially bases its claims on Tyler's (1950) rationale which suggests that curriculum sources should include studies of the learner, studies of contemporary life outside the school, and suggestions from subject specialists. The crucial first step in the Tyler rationale on which all else hinges is the statement of objectives. The objectives are to be drawn from these three sources. The objectives are then to be "filtered" through philosophical and psychological "screens". Tyler, however, brings together the views of the philosophies which had advocated that each of these studies was by itself a source of content for an independent curriculum, hence, the notions of "child-centered", "society-centered", and "discipline-centered" curricula, the distinction which 'does not seem to contribute further insight into the complexity of current thought in curriculum' (Eisner and Vallance, 1974, pp. 3).

Mauritz Johnson (1968) has recently initiated a different school of thought which argues that the needs and interests of the learners, the values and problems of the society and the disciplines or organized subject matter 'may indeed impose criteria for the selection of curriculum items, but only the third one can be considered a source of them' (p. 45). The disciplines are in fact 'a partial source, since they ignore the body of unorganized knowledge and related skills and attitudes that lie outside of the recognized disciplines' (p. 45). Johnson (1968) suggests that the only possible source is "the total available culture" or "cultural content", that is, 'those elements of the content of the culture which are considered appropriate or relevant to the instructional aims of the school' (p. 45). In supporting Johnson's rationale, Aoki (1970) stipulates that 'this cultural content can be thought of as consisting in the main of disciplined and non-disciplined knowledge, or as Goodlad would have it, "funded knowledge" and "conventional wisdom"' (p. 4).

On the other hand, Kliebard (1975) argues that subject matter specialists is in fact not a source at all but a means of achieving objectives drawn from the other two Tyler's sources. Studies of the learner and of society depend so heavily for their standing as sources on the philosophical screen that it is actually the philosophical screen that determines the nature and scope of the objectives. To say that educational objectives are drawn from one's philosophy, in turn, is only to say that one must make choices about educational objectives in some way related to one's value structure. Kliebard argues that this is to say so little about the process of selecting objectives as to be virtually meaningless. Although Kliebard's reappraisal of Tyler's rationale is really challenging, it does not clarify the concept of "source(s)".

II. PROPOSED CONCEPTION OF THE TERM SOURCES OF INSTRUCTIONAL CONTENT

The Meaning of "Culture" and "Ecology"

In trying to clarify the concept of source or sources, the concepts of "culture" and "ecology" are introduced and their meanings must be established before it can be shown how they relate to this problem. This discussion draws heavily on Mikesell's (1970) documentation on the two concepts.

The modern meaning of the concept "culture" a term derived from the German "Kultur" and the Latin "Cultura" was established by Edward Tyler in 1871, who defined culture as 'that complex whole which includes knowledge, beliefs, arts, law, morals, and any other capacities and habits acquired by man as a member of society' (Mikesell, 1970, p. 40). Numerous other definitions have been proposed (Peter, 1973), but there seems to be general agreement that culture refers to man-made parts of environment and to patterns of learned behaviour. In other words, culture does not refer to human reflexes or drives _per se_, but rather to elements of man's mature endowment that he has acquired from his fellow men by learning or conditioning process. "Culture" is the highest level of integration in the study of mankind and hence, subsumes more specific concepts such as "economy", "society", and "government". The concept culture thus represents a way of thinking about the world, rather than a particular class of phenomena (Mikesell, 1970, p. 40).

However, some seeming paradoxes make the use of this concept inevitably difficult. One such paradox is that, although there are many universals of culture (language, religion, social organization, livelihood, entertainment, and the like) each local manifestation of these elements is unique, leading to the conception of "cultures" or "sub-cultures". But if the "areas of influence" of these sub-culture elements were mapped, there would not be neat boundaries of localized cultures as in the case with boundaries delineating physical features of the landscape. The resulting overlapping would suggest the temporal and spatial diffusion of cultures. Thus, the second paradox is that culture is stable and yet dynamic. Examples of true stagnation are hard to find, and continuity is evident even in cases of rapid evolution and revolution. Cultural dynamism over time and space is a function of cultural processes such as invention, diffusion, adaptation and accommodation (Mikesell, 1970, p. 41). Johnson (1968) emphasizes the importance of this aspect of culture in program development when he says that 'modern communication makes available cultural content that is not indigenous to the society in which the curriculum is formulated. Some indigenous cultural content may be unavailable due to the secrecy of those in possession of it' (p. 48).

The concept "ecology" was first proposed by the Swiss biologist Ernst Haeckel to refer to the correlation between organisms living together in a particular locality, and their adaptation to their surroundings. Subsequent usage by biologists has retained the essential features of Haeckel's definition. For example, the Penguine Dictionary of Biology (Baltimore, 1951) describes "ecology" as the "study of the relations of animals and plants, particularly animal and plant communities, to their surroundings, animate or inanimate". This definition and, indeed, all biological definitions of this term refer to external or environmental factors in contrast to internal factors or mechanisms within organisms.

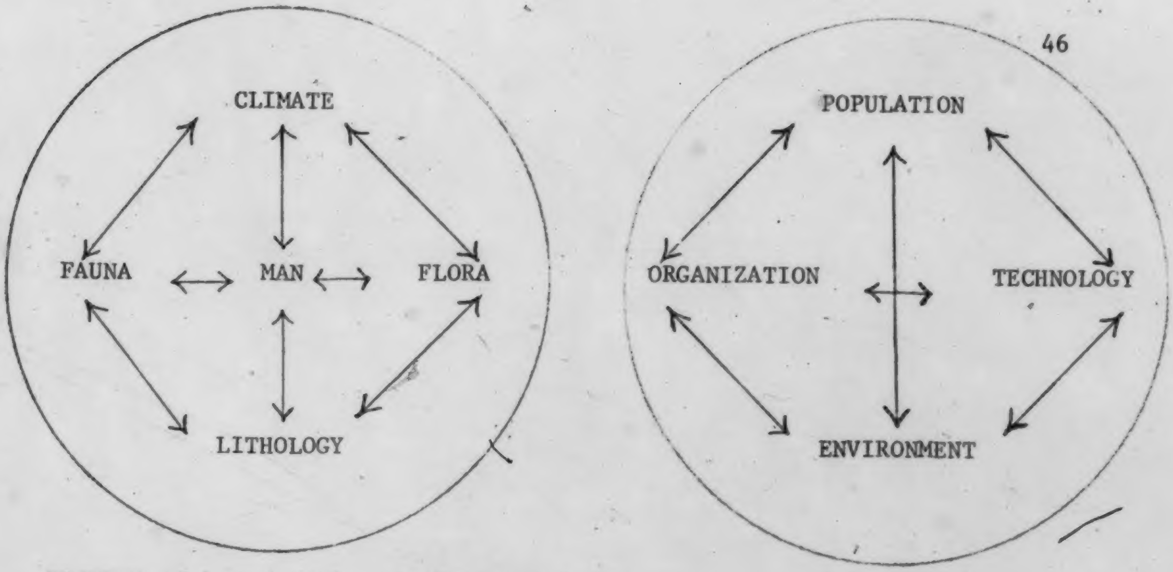
The transfer of the idea of ecology to human communities required an expansion of the original biological definition to include, not only the concept culture, but also that of modified or artificial environments. In subsequent decades, the concept of ecology has been applied also to political science, psychology, anthropology, archeology and geography. Many of these applications depart from the biological conception of ecology (Mikesell, 1970, p. 41).

Cultural Ecology as a Source of Content

The two concepts of "culture" and "ecology" merge to form the concept of "cultural ecology" in which nature and culture are seen not as opposing forces or separate entities, but rather as interlocking components of an "ecosystem", that is, 'a set of living organisms and non-living substances interacting to produce an exchange of material between the living and non-living parts' (Mikesell, 1970, p. 42). This definition of the "total environment" differs from the conservative definition which was in the past advocated by environmentalist tradition in geography that environment is a complex of natural phenomena. The natural and cultural elements of the ecosystem are not necessarily well defined, for man has had a profound effect upon nature. The concept of ecosystem is not here limited to physical phenomena, rather it embraces the totality of nature and culture, man himself being both natural and cultural.

Figure 2(a) illustrates that the ecosystem consists of the elements climate, lithology, fauna and flora which are in mutual interactions and they may be in a state of equilibrium which shifts and "tilts" in accordance with the nature and type of the input into the system. As part of nature, man belongs to the element "fauna", and is identified as a "mammal" of the sub-category "homo sapien". Man is thus a member of the biotic system which comprises of fauna and flora. However, due to his higher intelligence, his language and other abilities to think, behave and act upon the total environment better and more extensively and more meaningfully than other mammals, man puts himself in the center of the ecosystem and uses the other elements, other mammals included, to seek ways and means of living. Man's physical-and-biotic environment includes the four elements and his cultural environment consists of those attributes of his total environment which are the result of his transaction with the natural environment. The term "transaction" implies that men act upon the world, and change it, and are changed in turn by the consequences of their actions.

In Figure 2(a) cultural ecology is viewed from the aspect of the elements of the ecosystem. In Figure 2(b) cultural ecology is viewed from the cultural aspect in which the transactional properties of man's total environment are emphasized. However, both aspects involve the same elements and processes of man's cultural ecology, his total environment which we term the world. The world as a planet belongs, in turn, to a larger system called the solar system.



FIGURES 2(a) and 2(b): Cultural Ecology

This conception of total environment, unlike the view held by environmental determinists, does not merely assume local relationships of society and its habitats. Modern scientific and technological improvements in transportation and telecommunication have caused the world to "shrink" in the sense of increased speed and movement, expansion of one's "action space" and thus increase in one's within and between interaction at local, regional and international levels.

The thesis held in this study is that the only source of whatever learnings man demands is the cultural ecology or the total environment. For educational purposes of using it as a source of learnings, cultural ecology can conceptually be divided into two related environments as proposed by Simon (Found, 1971), the "extended" or "real" environment and the "decision" environment. The extended or real environment comprises what is normally referred to as real world or real life environment. The decision environment, also a cultural component, consists of what will be termed as the "display". The display refers to whatever man makes or uses to represent the real or indigenous environment. A display may consist of objects such as maps, books, atlases, pictures, diagrams, journals, tapes; actions and events that would convey to a person some kind of knowledge, skills, attitudes and values from the real environment. A display consists of the media of recording, preserving and communicating information and learnings about and from the real environment. The term display as here used does not include instructional materials directly extracted from the real environment. Materials existing in their indigenous forms such as samples of rocks and rock forming minerals, soil types, industrial and agricultural products are not the display because they are real components of the real world. Such chunks of the real environment can still be transformed into the display. What are usually called "teaching materials" or "teaching aids" are here viewed as synonymous to instrumental content. Note that a display can serve as a source of instructional content and as an instrumental content.

The extended and decision environments are not the same sources of learnings for two main reasons: '(1) man seldom feels the need or the ability to learn about the extended environment. If he does recognize the need to obtain a mass of information, his limited perceptual abilities force him to simplify the real environment into something with which he can cope (the display). (2) Imperfect communication restricts the information with which he can come into contact' (Found, 1971, p. 131).

The concept of "sources" in educational endeavour applies to both real and decision environments. Figure 3 shows that the real

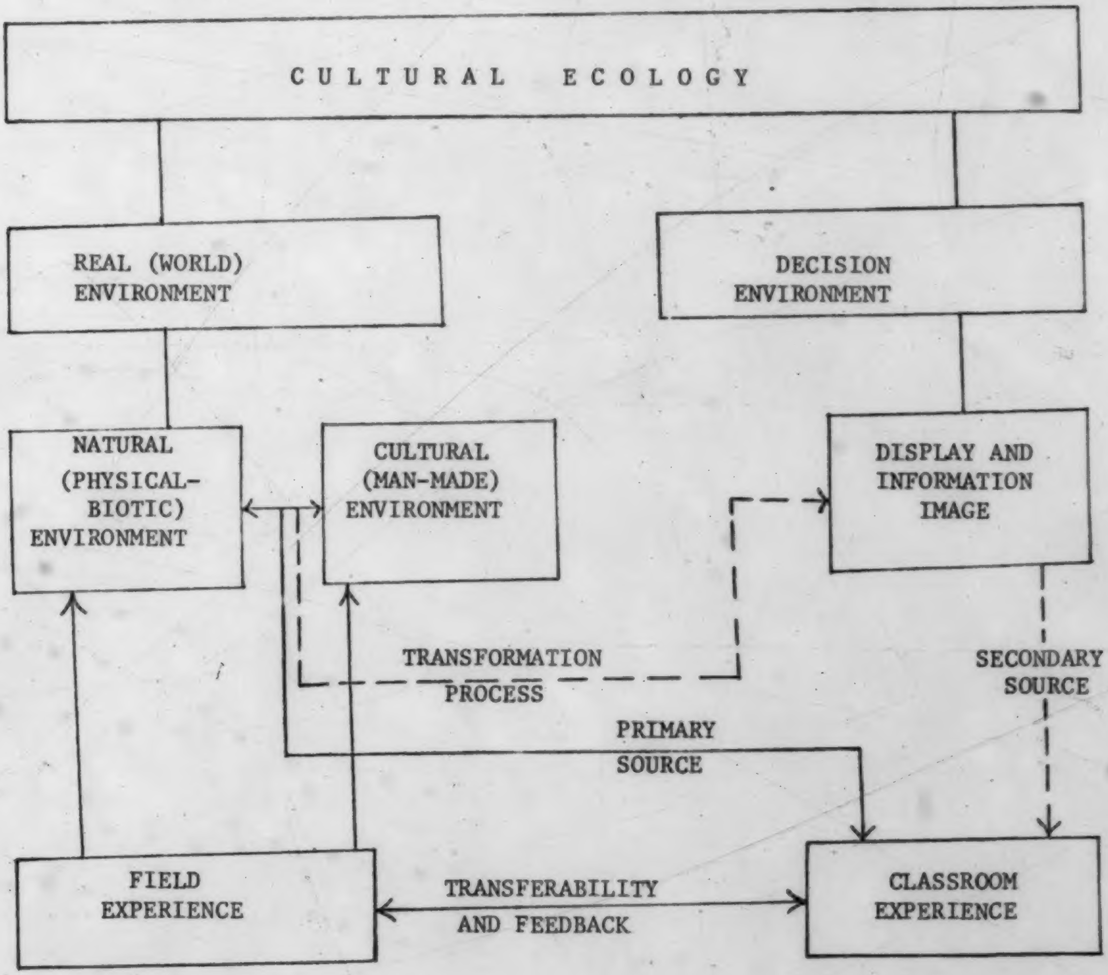
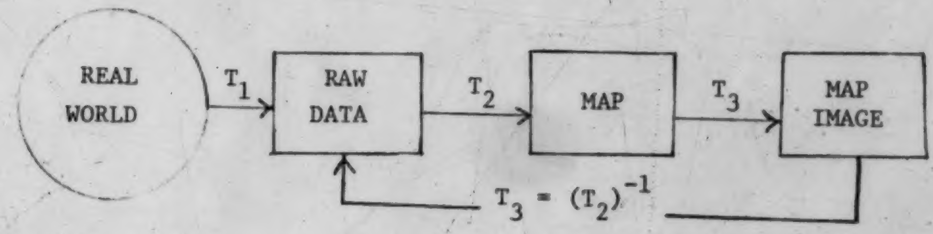

CULTURAL ECOLOGY
REAL (WORLD) ENVIRONMENT
DECISION ENVIRONMENT
NATURAL (PHYSICAL-BIOTIC) ENVIRONMENT
CULTURAL (MAN-MADE) ENVIRONMENT
DISPLAY AND INFORMATION IMAGE
TRANSFORMATION PROCESS
SECONDARY SOURCE
PRIMARY SOURCE
FIELD EXPERIENCE
TRANSFERABILITY AND FEEDBACK
CLASSROOM EXPERIENCE

FIGURE 3: Cultural Ecology as a Source of Instructional Content.

environment is a "primary" or indigenous source of instructional content; it is the source of first-hand content. The decision environment forms a "secondary" or second-hand source of instructional content. The significance of this distinction can further be appreciated by examining the nature of each environment and the relationship between them.

The real environment is always in a state of flux: its content is always dynamic, whereas the content of the decision environment is always static, that is, a picture, a map, a book, a film and even a particular televised program refers to a definite moment in or period of time and to a particular place or area. Because a display is static, it quickly becomes obsolete and irrelevant to contemporary and future situations. In other words, it soon no longer represents the realities of life in the real environment. A display will thus become out-of-date as a result of the changing chunk of the real environment which it represents or explains. A new display, sometimes similar to or quite different from the old one has to be made in order to cope with and provide a reference for the dynamism of the real environment. Few types of display do stand the test of time. However, some types of display have been stocked and preserved as a reference for the past events and a major secondary source of historical studies. Such studies sometimes reject this source and utilize the primary source by employing various techniques such as excavation of past sites, interviews with the old generations and the like. The practice of quoting the date of reference is one evidence that display makers and users are normally conscious of its static nature.

The relationship between the dynamic primary source and the static secondary source is indicated in Figure 3 by one-way dotted line. It is one-way relationship in the sense that any display is always a direct product of and indeed dependent on the real environment. Muehrcke's (1970, pp. 199-200) and Pattison's (1970) cartographic processing models (Figures 4(a) and 4(b)) illustrate the transformation process depicted in Figure 3. In Muehrcke's model, the cartographic processing system is viewed as a series of transformation. The transformation process begins with data collection from the real world (T_1), the cartographer transforms these


REAL WORLD
T_1
RAW DATA
T_2
MAP
T_3
MAP IMAGE
$T_3 = (T_2)^{-1}$

T_1 = Data Collection; T_2 = Mapping; T_3 = Map Reading.

FIGURE 4(a): The Cartographic Processing System (Muehrcke, 1970, p. 200).

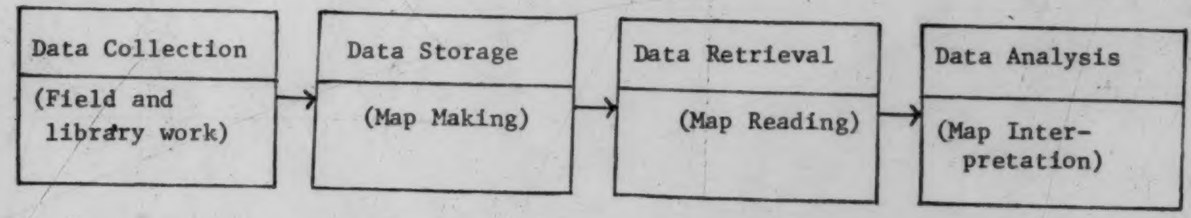

Data Collection
(Field and library work)
Data Storage
(Map Making)
Data Retrieval
(Map Reading)
Data Analysis
(Map Interpretation)

FIGURE 4(b): Sequence of Data Processing (Pattison, 1970, p. 21).

data into a map (T_2), and information is retrieved from the map through an interpretive reading process (T_3). This transformation involves image processing or map reading. A measure of the communication efficiency of the cartographic system is related to the amount of transmitted information, which is simply a measure of the correlation between input and output information. The cartographer's task is to devise better and better approximations to a transformation T_2, such that output from T_3 is equal to input to T_2. In order to maximize the approximations or to minimize the discrepancy between the intended message and the retrieved information, map reading transformation should be the inverse of the mapping transformation (T_2). Muehrcke expresses this relationship as $T_3 = T_2^{-1}$.

Pattison's sequence of data processing is the same as the former, only that the blocks include the processes while in Muehrcke's process model the blocks represent the product and the arrows depict the processes. However, in each case the transformation process by which a map is produced as a portrayal of the real world is one-way in the sense that the original data from which a map and map image are transformed are a direct product of and dependent on the real environment and not the converse. These models illustrate the transformation process through which any display can be generated from the real world environment. A certain display can be used to derive another display; such a transformation is secondary and not primary. For example, a picture mosaic can be transformed into map sheets, and these maps can be transformed into maps in an atlas and both types of maps can be changed into sketch maps.

Johnson's "total available culture" as a source of content may be equated with the concept of cultural ecology only if it does not overlook the conception of nature and culture as interlocking components of the total environment. As a source of instructional content, cultural ecology includes both the oecumeni and the uninhabited earth-space. And man operates within nature rather than apart from it or merely in response to the dictates of nature. Both cultural and natural aspects of the cultural ecology constitute relevant content for an instructional program.

III. IMPLICATIONS OF THE TWO SOURCES

Two educational schools of thought might be associated with the distinction between "real world" and "display" sources of instructional content. Some educators emphasize that learners should essentially use the real environment. Thus Ivan Illich (1970) whose philosophy of education bases on that of Jean-Jacques Rousseau, has advocated the destruction of the classroom and the turning of students over to the real world. However, some advocates of "direct" learning appreciate the use of decision environment as a means of learners to activate the real environment. The other school of thought emphasizes the exclusive use of the display as the source of instructional content, although some of its advocates would appreciate the bringing of chunks of the real environment into the classroom. To this school of thought, funded knowledge, particularly the textbook, is the major source of instructional content and the aim of education is to have the learner acquire the information rather than use it as a means to an end.

Skinner (1973) thinks that one limitation of teaching and learning by only utilizing the real world is that instruction tends to emphasize what is only relevant to the present. It makes no explicit appreciation for the future and if it does, it at best focuses on an immediate future. However, if the display is the product of the dynamic real world, one wonders whether the remote future can better be ascertained from the static decision environment. One problem seems to be that if no display were to be used in teaching and learning, the learners would experience a very limited environment and would thus receive parochial education, for not every desired learning would be found in the immediate real environment.

Exclusive reliance on the decision environment which employs different types and forms of display as a sole source of instructional content has some disadvantages which seem to be more severe than reliance on the real environment. A display can become obsolete such that the content taught becomes irrelevant to the present and future context of the learners and their society. Obsolescence of textbooks has motivated some educators to place the emphasis on 'the use of a "document" in the classroom in the place of the textbook. The document has become the main teaching material, the point of departure from all problem studies' (Saint-Yves, 1974, pp. 27-28), because it is a form of display which more approximates reality and authenticity of the real world environment. The realization of the static and obsolete nature of the content of a display must be one reason why educators such as Biggs (1973) and Parker and Rubin (1968) suggest that in order to teach for the future and thus cope with the rapid changes characteristic of the contemporary world, learning processes should be emphasized in educational programs as content.

Studies of diffusion of innovations have revealed that 'the extent to which individuals and groups search for and learn to use information varies considerably according to the scale and medium through which the information is obtained. A related complication is that it seems to be impossible to communicate information completely objectively. Individuals or groups passing on facts distort them somewhat, either consciously or subconsciously' (Found, 1971, p. 145). In Figure 3 the line of transformation process is dotted to depict this notion, that the information which diffuses from the real environment to the classroom through various communication channels or types of display, always involves a degree of distortion. Muehrcke (1970) also observes the same tendency involving the cartographic transformation system. Besides the map user exhibiting the inability to read a map without further distorting the flow of information due to the inherent or acquired limitations, 'the tools and materials of the map maker introduce random and systematic distortions into cartographic information processing' (p. 217).

Some distortions have deliberately been conventionalized by man, possibly for the purpose of simplifying reality, that is, the display, motion pictures included, cannot accommodate fully the complexity of the real environment. Thus a map user has to be aware of the distorted information which results from the notion of scale. The "word" which conventionally represents human conception of reality is itself incapable of conveying information which is absolutely free from error or distortion. Yet a written word is the most common label for what man thinks and does. All these serve as an indication of the inadequacy of a display as a sole source of instructional content. Studies have shown that misconceptions of places made by students in map reading can be the result of these distortions (Bartz, 1970).

Furthermore, there is a time lag between data collection from the field (and library work) and the adoption of findings or products in the classroom. This time lag affects the nature, types, and availability of the display forms used in the classroom experience. The feedback and transferability of the in-class experience to the field experience are unlikely to take place if instruction only uses the display. Since a display always transmits somewhat distorted and obsolete ideas to the teacher and the learner, exclusive reliance on decision environment as a source of program content should be a myopic decision. We need a rich mixture of content from both primary and secondary sources, and the extent to which the program draws instructional content from each source should be based on suitable selection criteria.

VI. GEOGRAPHY AS A SOURCE OF INSTRUCTIONAL CONTENT

In order to understand how geography serves as a source of instructional content, it must be shown how it fits into the proposed scheme of the concept source(s). This necessitates a brief exploration of the nature of geography. The existing literature on the nature of geography is indeed vast, but the issue is still controversial among the geographers. The disagreement as to what geography is or should be reflects the difficulty involved in defining the "discipline". In fact, Walmsley (1974, p. 96) finds it both subjective and dangerous to attempt to define any discipline. This problem seems to concern the type of criteria upon which to base the definition.

One approach to justify the discipline's identity has been based on historical or traditional grounds. Lukermann (1964, p. 167) stipulates that a field of study is best defined, not by an etymological analysis of its name, nor by its logical place among the sciences, nor by its place in curriculum, but rather by its history of development. Lukermann conceives a discipline as a social matter, a community of scholars carrying on a conversation of common interests, asking questions, suggesting tentative answers which lead to further questions. Thus a discipline is best defined by the questions which, in one form or another, continuously recur over time. Indeed, many geographers (Pattison, 1964; Lukermann, 1964; Moore and Owen, 1960; Wrigley, 1965; Broek, 1965; Olson, 1968; Hill, D., 1972; Walmsley, 1974) have used the historical-traditional approach to establish the philosophy and methodology of the geographic discipline.

A second and more recent approach to establish the nature of the discipline is to identify its conceptual structure. Murphy (1973) considers the structure as the most central criterion for defining a discipline. A discipline 'must be focused and organized if it is to yield anything more than personal satisfaction. Information by itself does not produce knowledge; conceptual analysis is necessary. That is what "discipline" means, in academic terms: the investigation of phenomena in accordance with a previously developed set of concepts and techniques which together form a coherent whole and can give useful meaning to study of the materials it chooses' (pp. 1-2). Moore and Owen (1966) also emphasize the structure of the discipline when they write: 'a discipline must have an organization which reflects its philosophical core, if it is to be worthy of serious study. This philosophical justification must explain its purpose and particular manner of investigation, and, probably most important of all, explain precisely what it does that no other discipline attempts to do' (p. 8).

Both approaches, however, base on historical and conceptual grounds, and, thus, as it will be noted later, they overlap. The difference between them is mainly a matter of emphasis. The shift from purely historical-traditional emphasis to defining a discipline in terms of its structure, its key concepts and principles, seems to evolve from the field of Education particularly in relation to the need to improve instructional programs. Several educators and/or geographers (Kohn, 1963; Lukermann, 1964; Thomas, 1964; Picker, 1965; Broek, 1965; Warman, 1966; Taaffe, 1967; Senesh, 1967; Harvey, 1969) have attempted to identify the structure of geography.

Historical-Traditional Approach

That geography is the study of the world as it exists in places, is a view which has a long history in geographical literature. One can see it by tracing, from ancient times to the present, the viewpoints of geographers concerning the purposes of their studies. Strabo, the Greek geographer; the Moslem geographers; Kant; Humboldt and Riter; and recently, Heltner, Sauer and Hartshorne, to mention a few, have all recognized the differences which exist from place to place on the earth's surface and accordingly based their studies on a chorological concept. The chorological concept, the "scientific" study of places, has historically and traditionally been the central theme in geography. From this viewpoint, geography has traditionally had defensible position among the sciences.

Concerned with actual sections of reality on the earth's surface, with areas (or regions), geography has more in common, in respect to its character, with history which is concerned with section of reality through time (Moore and Owen, 1966, pp. 11-12). It is the character of the place, the areas of the earth's surface that form the subject matter of geography (Lukermann, 1964, p. 168).

While it is true that geography studies places, the concept of "region" was originally associated with the large-scale, global areas rather than small areas. Geography was the study of areal differences and similarities of places in terms of "Regional Geography of the World" evident in Appendix I in which "area-studies" are treated country by country, and continent by continent according to the fixed formula. This conception of a region did also popularize the dichotomy between regional geography and systematic (topical) geography.

The concept of cultural ecology does not conflict with the view that geographers study areas of the earth's surface. A particular cultural ecology can in fact be referred to as a place or area of the earth's surface in which certain people transact with each other and with climate, lithology, fauna and flora. The interlocking cultural and physical and biotic processes of that cultural ecology give character to that place or area.

Pattison (1964(a); 1964(b); 1970) is one geographer who has used the historical-traditional approach to establish the frontiers of geography. Pattison postulated four historic thrusts in geography and dubbed them: (i) the spatial tradition, (ii) the area studies tradition, (iii) the man-land tradition, and (iv) the earth-science tradition. Pattison entitled this formulation "The Four Traditions of Geography".

1. Spatial Tradition

Mapping is the key to spatial tradition. Thought, in this tradition, concerns itself with position-and-layout on the surface of the earth. It thus focuses on mapping phenomena of location and movement, distance, form, direction and position, and thus is oriented to cartographic information.

The central concern of mapping is to represent the real world spatial distribution of a phenomenon or phenomena. Thus, spatial tradition deals with mapping a "spatial distribution". Since a map is a form of "display", that is, a graphic portrayal of spatial distributions, the spatial tradition is concerned with the process of transforming the real environment into the decision environment and the reading and interpreting of what the map represents.

2. Area Studies Tradition

The area studies tradition is dedicated to the study of unique aspects of regions: the nature and character of places and areas, their differentiation, association (areal coherence or similarities), spatial interaction (interdependence of phenomena) and their systematization (localization and regionalization). In short, area studies (chorographic tradition) centers on the concept of "region".

Von Thunen's (Chisholm, 1962) model of Isolated State, Christaller's (1966) Central Place Theory, Burgess' Concentric Zone Theory and Hoyt's (Thomlinson, 1969) Sector Theory, and Taaffe, Morril and Gould's (1963) model of the patterns of transport development in underdeveloped countries are a few examples of studies which have focused on the identification of geographic regions. In these area-studies, however, the concept of region is not viewed in the traditional sense.

3. Man-Land Tradition

The man-land tradition is oriented to the functional relations between societies or human activities and the earth environment. Its purpose is to illuminate the significance of habitat in human affairs and the role of man-in-society in changing the face of the earth. While the other traditions are essentially devoted to the processes and methods of understanding and utilizing the elements of cultural ecology, this tradition is what actually centers man in the ecosystem. Figure 2 depicts the functional, transactional nature of man with his environment.

4. Earth-Science Tradition

The Earth-Science tradition is involved in researching into the physical and biotic properties of the earth. It establishes the relationship between geography and fields of study such as climatology, meteorology, hydrology, mineralology, glaciology, geomorphology and other earth-science specialized fields of learning.

In his overview of the discipline of geography, Pattison states:

> "The four traditions though distinct in logic are joined in action. One can say of geography that it pursues concurrently all four of them. Taking the traditions in varying combinations, the geographer can explain the conventional divisions of the field. Human or cultural geography turns out to consist of the first three traditions applied to human societies; physical geography is the fourth tradition. Going further, one can uncover the meanings of "systematic geography", "regional geography", "urban geography", "industrial geography". (p. 216).

Pattison (1970) has further classified these four geographic interests in two organizations of thought referred to as Geography A and Geography B. For Geography A which comprises of traditions three and four, geographers show a pronounced preference, on the whole, for the study of rural life. They typically raise questions about the bearing of climate and other environmental conditions on human welfare, and they deal as a group, in issues surrounding the management and conservation of natural resources. Geography B comprising traditions one and two, is oriented on the whole, toward the study of urban life. Geographers tend to favour the investigation of the role of distance as an independent variable in human affairs and they typically conceive of political and economic subjects in terms of "areal organization". Although this distinction is rather arbitrary, it helps to view geography in terms of rural-urban continuum within the entire cultural ecology. The four traditions, though have their limitations and critics (Taaffe, 1967; Olson, 1968) are consistent with the proposed framework of the concept source or sources. They demonstrate that, as a source of intructional objectives and instrumental content, geography exists in both real and decision (maps, books, globes) environments. The fourth tradition is here viewed in terms of the actual or funded distribution of the earth's physical and biotic characteristics which interlock with the cultural aspects of the cultural ecology.

Structure of Geography

Besides helping to understand the nature of geography, the discussion on the structure of geography provides the background to the subsequent exploration of the criteria for selecting and organizing instructional content and activities.

The structure of geography can be conceived as a logically consistent conceptual system in which a limited number of basic concepts are identified and then employed or synthesized to define additional terms of a more sophisticated or complex nature which then are employed to define even more complex terms (Thomas, 1964, p. 45). That is, the structure is hierarchical in that it bases on the hierarchy of concepts. The notion of "hierarchy of concepts" will be observed in later discussion. Here, the focus is on the identification of the structure itself. Since there are various suggestions of the structure of geography, the foregoing discussion is selective. Wherever possible, a synthesis of various contributions is made.

Thomas (1964) suggests that, in general the system follows the following structure (Figure 5):

> 'First, we have the basic notion of a geographic fact. Geographic facts, once defined may be expanded into the concept of the spatial distribution. The notion of the spatial distribution may be developed, in turn, into the concepts of spatial interaction and areal association. Then the concept of the region may be synthesized from the notions of the spatial distribution, spatial interaction or areal association, depending upon the type of region one wishes to treat, that is, its degree of complexity or sophistication. However, the definition of the term, region, is such that there is no logical inconsistency when one develops the regional concept from the notions of spatial distribution, spatial interaction, or areal association. The concept of scale may be treated as another basic concept which enters the system at an elementary level and then continues to operate throughout it, modifying particular geographic facts, areal associations, spatial interactions and regions' (p. 45).

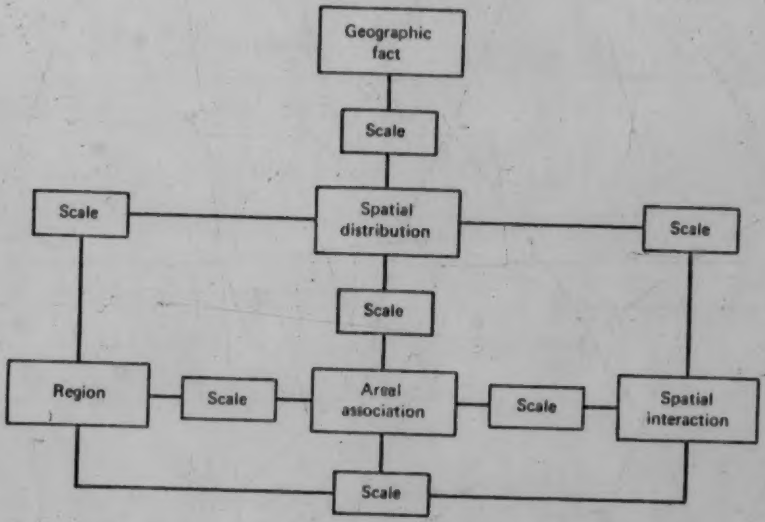

Geographic fact
Scale
Scale
Spatial distribution
Scale
Scale
Region
Scale
Areal association
Scale
Spatial interaction
Scale

FIGURE 5: A Structure of Geography (Thomas, 1964, p. 45).

In Figure 6, Senesh (1967) employs Peter Greco's scheme to illustrate the fundamental ideas in geography. This diagram, however, builds on Thomas' structure to elaborate on the constituents of geographic facts and the processes leading to formal and functional regions. The fundamental ideas are described thus:

> '1. Every geographic area is affected by physical, biotic, and social forces.
> 2. The impact of these forces on a geographic area creates similarities among areas. These similar areas are called uniform regions. They are static in character.
> 3. The similarities among different areas have been brought about through different combinations of physical, biotic, and societal forces.
> 4. An area may be kept together through a pattern of circulation binding the area to a central place. This area is called a nodal region, held together by functional relationships. The nodal region is dynamic in character.
> 5. Uniform and nodal regions are often related to each other through gravitation to the same central place' (p. 35).

These ideas establish a direct link between the structure of geography and the proposed framework of sources. When Figure 6 is compared with Figure 3 the physical and/or biotic and/or societal phenomena which occur in space and time via first-and second-hand knowledge match with the primary and secondary sources. Fieldwork compares with field experience; expository reports, photo-interpretation and statistical techniques refer to transformation processes of producing a display which stores and conveys funded geographic facts of the real (world) environment.

1. Geographic facts

Geographic facts refer to facts which define or describe the character of a place of the quality or quantity of some phenomenon which occupies a place at a given time. Thus, geographic facts have three components: (i) the event or occurrence, the character or the quality or quantity of some phenomenon; (ii) its location, the specification of the place or places of occurrence, and (iii) the time at which the event was observed. Geographic facts must consist of locative element.

A place can be identified, that is, its location specified, in one of three ways: (i) nominal location in which reference is made merely to the name attached to some place. In capes-and-bays geography teaching, much of what is taught is merely the memorization of nominal locations. (ii) Mathematical specification, that is, specification of location in terms of grid or polar co-ordinates (latitude and longitude). (iii) Relative location which merely specifies generally the location of a place relative to some other such as closer or farther, or upstream or downstream from some reference point (Thomas, 1964; Kohn, 1963).

To avoid pouring names of places to students, Picker (1965) suggests that not until meaningful sets of values are assigned to locations (and this does not necessarily include latitude and longitude or grid co-ordinates) will spatial patterns of organization assume any substance. For example, rather than locating cities by latitude and longitude *per se*, it makes sense pedagogically to map all cities by size and rank. Locating nation-states takes on greater meaning if the states are categorized by governmental system, per capita income, or population. In each example, an identical operation is performed; a specific point is identified by value assigned to that point. In this way the student learns the "where" of persons, places and things.

Distance has at least three different notions, each of which is important to geography: (i) direct earth distance defined as the number of earth distance units, such as miles or kilometers, separating two places. (ii) Economic distance in which the separation between places is expressed in monetary, hour units. (iii) Psychological distance which refers to the way people perceive various earth and economic distances. It is assumed that individuals may perceive distance differently in response to a great many factors such as their income, the time of the day, or weather conditions (Thomas, 1964, p. 47).

2. Spatial Distributions

Spatial distributions or spatial arrangement (Kohn, 1963; Thomas, 1964; Picker, 1965) involves "location sets" or grouping of points. Thomas (1964) defines spatial distribution as 'a set of geographic facts representing the behaviour of a particular phenomenon or characteristic of many places' (p. 49). Spatial distributions are traditionally portrayed by a map because, by using a map, one can graphically array a spatial distribution without

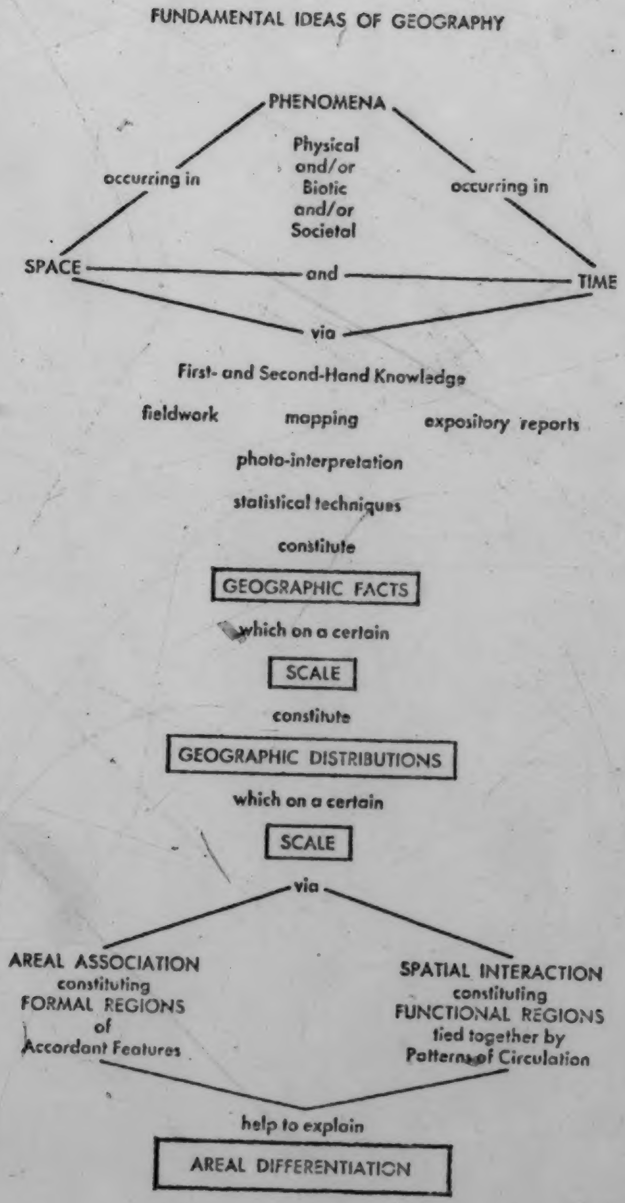

FUNDAMENTAL IDEAS OF GEOGRAPHY
PHENOMENA
Physical and/or Biotic and/or Societal
occurring in
occurring in
SPACE
and
TIME
via
First- and Second-Hand Knowledge
fieldwork
mapping
expository reports
photo-interpretation
statistical techniques
constitute
GEOGRAPHIC FACTS
which on a certain
SCALE
constitute
GEOGRAPHIC DISTRIBUTIONS
which on a certain
SCALE
via
AREAL ASSOCIATION constituting FORMAL REGIONS of Accordant Features
SPATIAL INTERACTION constituting FUNCTIONAL REGIONS tied together by Patterns of Circulation
help to explain
AREAL DIFFERENTIATION

FIGURE 6: Fundamental Ideas of Geography (Senesh, 1967, p. 36).

losing the important locative, temporal and indicative information contained in each component geographic fact while maintaining information concerning the general shape, distance, direction and size of relationships which exist in the "real world" between the individual facts. A large photograph of a particular spatial distribution approximates more the real environment than a map.

All spatial distributions are composed of three elements, each of which is independent of the other and by which distributions can be generally characterized. These elements include pattern, density, and dispersion or areal extent of sets of locations.

The patterns of a spatial distribution is defined as the areal or geometric arrangement of the geographic facts within a study area without regard to the size of the study area. The density of a spatial distribution is defined as the overall frequency of occurrence of a phenomenon within a study area relative to the size of the study area. Related to density is the concept of "concentration" (Picker, 1965) which defines the density of a sequence of points which belong to one location set or several. The dispersion of a spatial distribution is defined as the extent of the spread of geographic facts within a study area relative to the size of the study area.

The differences between pattern, density and dispersion of a spatial distribution are illustrated in Figure 7. In both, Figures 7(a) and 7(b) the patterns of the phenomenon are uniform because all dots are arranged so as to be equally spaced from each

7

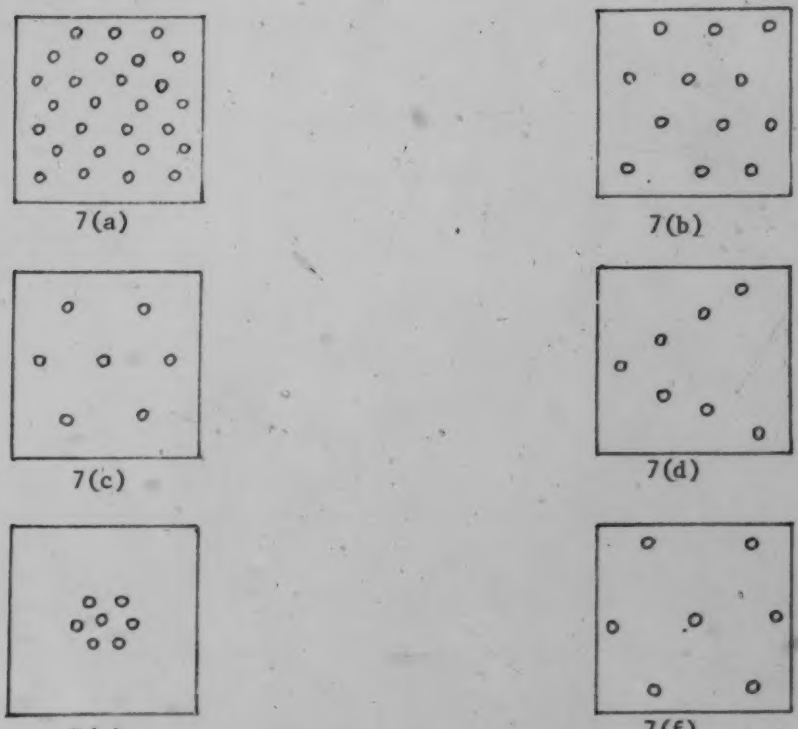
other. However, the densities, or frequencies of occurrence relative to the size of the areas, are different. Contrariwise, in Figure 7(c) and 7(d) different patterns are shown but the densities are the same. Figures 7(e) and 7(f) illustrate dispersion. In both Figures, the density of dots is the same and the patterns are the same because pattern is defined as arrangement without regard to the size of the study area. However, the dispersion of the dots, the extent to which they are spread over the study area, differs.

Spatial distributions may be continuous or discrete. Continuous spatial distribution may be defined as one in which occurrences of phenomenon in question occur at all points within a study area. Air, temperature, barometric pressure and altitude are phenomena which form a continuous distribution because they are present at any and all points within a study area. Discrete spatial distribution is one in which occurrences of the phenomenon in question are separated by areas of nonoccurrence within the study area. Maps of gravel pits form discrete spatial distribution because each pit in the area is separated by a definite distance from all others. Very frequently, phenomena which occur discretely in the "real world" are, in a particular study, treated as being continuous. Such discrete spatial distributions are said to be logically discrete but treated continuously.

Related to spatial distribution are concepts of "localization" and "decentralization". "Localization" means concentration of an activity in limited area. In turn, it may attract other activies. For instance, a port city may draw shipbuilding and chemical industries. These phenomena of "linkage" result in nucleation of employment and population with characteristics different from those of surrounding areas. In measuring localization one seeks for intensity of occurrence rather than for mere distribution (Broek, 1965, p. 74).

In the instance of concentration, locations are distinguished by per unit of a given area and their density relative to that for similar locations compared to an overall area. Thus, for example, uneven distribution such as industry, population, or vegetation may show high location densities. The densities are defined as concentrations (Figure 8(a)).

Overlapping this spatial arrangement, centralization defines the relationship between a series of locations and a specific point (Figure 8(b)). Since the concept of centralization depends upon an exact definition of distance and positions among locations, it is a difficult idea to draw directly from the map. In its essence, centralization sets down the distance and positional relationship between a set of locations and a given point. Certain activities, some dependent on one another, some independent, cluster about a focus, technically referred to as a central place. Note that in some cases concentrations will also evidence centralization.

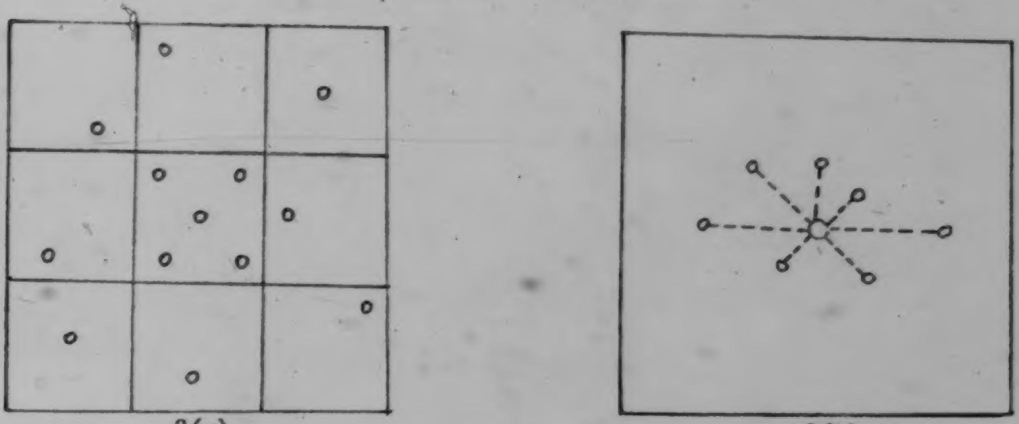


7(a) 7(b)

7(c) 7(d)

7(e) 7(f)

FIGURE 7: An Illustration of the Differences Between Pattern, Density, and Dispersion of a Spatial Distribution (Thomas, 1964, p. 53).



8(a) 8(b)

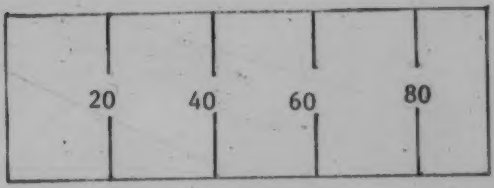
FIGURE 8: An Illustration of the Differences Between Concentration and Decentralization (Picker, 1965, p. 343).

3, Areal Association

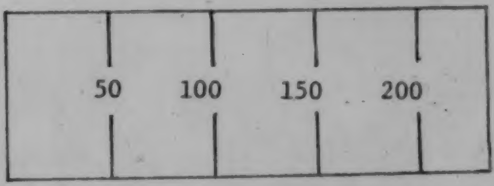
Areal association is 'the similarity within the same study area between two or more spatial distributions determined by information collected for the same unit areas' (Thomas, 1964, p. 56). Unlike geographic facts and spatial distribution which may be considered as aspects of data collecting and descriptive portions of geographic discipline, areal association includes geographic analysis.

Areal association can be defined in terms of geographic facts. As spatial distribution are assemblages of geographic facts, areal association may in turn be defined as a similarity between the two or more sets of geographic facts collected from the same unit areas. Figure 9 clarifies the meaning of the similarity of spatial distributions. It can readily be seen that if the highs and lows of two spatial distributions coincide, those distributions can be considered as being similar (Figures 9(a) and 9(b)). In this instance the association between phenomena Y and X is said to be positive. However, when the relationship between phenomena is negative, the spatial distributions also may be said to be similar. In this instance, the high values of Y occur in the same place as low values of X (Figures 9(c) and 9(d)). In the former, we may state that the areal association between Y and X is positive and in the latter that it is negative.

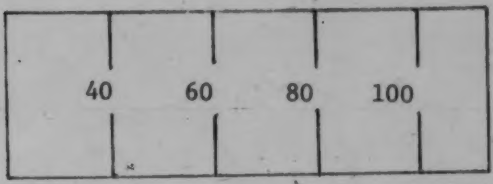
Areal associations have practical applicability in research and can be established by two major approaches. One general set of techniques involves visually determining whether or not spatial distributions are similar. One of the visual approaches involves the visual comparison of two or more maps. Using this approach, maps of several spatial distributions are prepared and then inspected to determine whether or not the various phenomena, when mapped, form



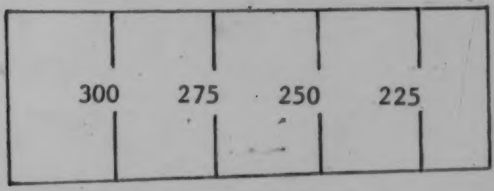
9 a. Isopleth map of hypothetical phenomenon Y, Study Area A, 1962.



9 b. Isopleth map of hypothetical phenomenon X, Study Area A, 1962.



9 c. Isopleth map of hypothetical phenomenon Y, Study Area B, 1962.



9 d. Isopleth map of hypothetical phenomenon X, Study Area B, 1962.

FIGURE 9: Similar Spatial Distribution Which Illustrate Positive and Negative Areal Association (Thomas, 1964, p. 57).

distributions which appear to be similar. Another visual approach involves the use of the scatter diagrams. The second general approach involves the use of statistical techniques to establish the similarities (Thomas, 1964, pp. 57-58).

4. Spatial Interaction

Spatial interaction, also referred to as "interdependence of places", is based on the notion that locations on the face of the earth are interconnected (Picker, 1965; Broek, 1965). Derived from inter-location, inter- and intra-regional flows, the concept of interaction binds locations within and between regions into spatial systems (Figure 10).

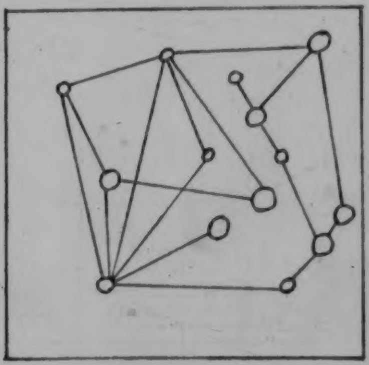


FIGURE 10: An Illustration of an Interaction System (Picker, 1965, pp. 344).

One, in this sense, is not dealing with points and areas; he is dealing with lines, real and imaginary. When railroads are mapped, for example, are cartographic pictures of an interaction system.

The rail network on the map outlines the spatial framework; the traffic moving between locations and the areas defines the interaction. Telephone calls measure interactions between cities and towns. Commuting flows can define urban and rural interactions. Electric power networks outline industrial systems.

The notion of transportation is not the only complementary force. Cultural behaviours also grow out of spatial interactions among populations. In all cases, however, dealing with interactions requires one to visualize lines on the map representing flows, directions of movements, and inter-connections over earth-spaces.

5. The Concept of Region

The term "region" is defined 'as an area of any size homogenous throughout with respect to announced criteria' (Nostrand, 1968, p. 15). Critical in this definition suggested by Derwest Whittlesey are the words "area of any size", because a region can range in size from an area smaller than a square foot of lawn to one as large as the entire earth shell.

Nostrand's (1968) "Model for Geography" (Figure 11) employs this definition to establish that 'all geography is regional geography' (p. 15) and that 'geography is not divided between regional and topical (systematic) branches' (p. 16). This model is based on the premise, first, that geography is a point of view expressed by the word "spatial", or by the phrase "earth-spatial distributions" (Chorological concept), and, second, that geography can be defined in terms of "patterns" and "processes".

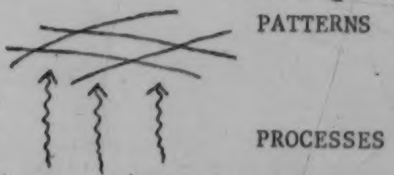


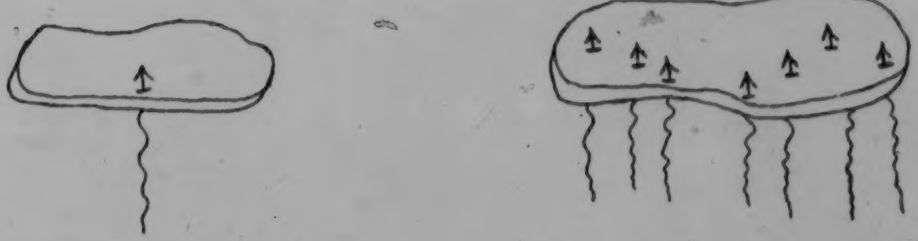
FIGURE 11: "A Model for Geography" (Nostrand, 1968, p. 15).

Patterns refer to the spatial dimensions of phenomena which exist in the three-dimensional zone called, by Hartshorne (1956, p. 25), the "earth shell". Processes, categorized under general headings physical, biotic, and cultural (Ackerman, 1958, pp. 20-26), and defined as 'sequence(s) of change systematically related as in a chain of cause and effect' (James, 1952, p. 197; 1954, p. 5), shape the patterns which exist in the earth shell. Processes can be thought of as kinds of phenomena studied in the systematic social or natural sciences. For example, the construction of a railroad network can be interpreted as a cultural process which helps to create settlement patterns. The relationship between patterns and processes works in two ways, because patterns can also be thought of as shaping processes. Thus, geography is both patterns and processes because to study processes alone is to study kinds of phenomena treated in the many systematically organized fields, and to study patterns without developing the processes which shaped them is to seek knowledge with relatively little meaning.

Figure 11 illustrates these patterns and processes. In this diagram, the symbol for patterns represents any patterns, whether they be above the immediate surface of the earth, for example, storm patterns in the atmosphere; phenomena such as vegetation and population on the surface of the earth itself; or, patterns of sub-surface lithologic structure. Processes are shown as three arrows drawn from below. Each arrow stands for one of three process groups - physical, biotic, or cultural; and each is drawn from below to imply that processes have built in, by definition, the idea of "sequences of change", or the time dimension which geography shares with history.

Regarding the concept of region in this model, one can simply substitute the symbol of a pattern for an ecnlosed area (of any size) which is understood to have "the thickness of the earth shell" (Figure 12).

The word "criteria" in Whittlesey's definition of region must also read "criterion" because, were this not so, it would not have been possible for the Whittlesey Committee to have single-feature regions (Nostrand, 1968, pp. 15-16). As shown in Figure 12, one



Single-feature Region

Multiple-feature Region

FIGURE 12: Single-Feature and Multiple-Feature Regions (Nostrand, 1965, p. 15).

criterion can be thought of as a single process taken from one of the three process groups to form a single-feature region, and many criteria can be thought of as many processes drawn from the process groups to form a multiple-feature region. A range in complexity exists from a really small single-feature region to global multiple-feature regions. Criteria, then, are process, and region patterns. And, as was the case with patterns and processes, one without the other is not geography: all geography is regional geography (Nostrand, 1968. p. 16). When this notion of region is related to Peter Greco's (Senesh, 1967) fundamental ideas in geography (Figure 6), it can be noted that, in varying combinations, these processes tend to create regions or patterns which are either static or dynamic in nature. It may be said that when physical-biotic processes play a greater role than cultural (social) processes, the patterns will tend to be more static than dynamic and when the converse takes place patterns will tend to be more dynamic than static. The term "static" should, however, be treated with care, for even patterns of the real environment which at first seem static are actually dynamic. The changes involved in such patterns may be discernible after a long period of time.

This model can be used in a second way to illustrate that geography is not divided between regional and topical branches. Traditionally, geographers have, for pedagogical and other purposes, distinguished between regional geography in which many topics are integrated in a relatively small place and topical (systematic) geography, for example, economic geography, in which fewer topics are integrated in a relatively large place. In a more traditional regional geography (which should not be confused with the concept of a region as defined by Whittlesey Committee), the criteria used to establish the areal extent of the region inevitably led to coverage of large places such as a country, a culture-area, a climatic zone of the continent or the world and the like (Appendix I).

In addressing himself to this question of whether geography is divided between "systematic" and "regional" geography, Hartshorne (1959) argued that no dualism exists but, rather, that there is a range along a continuum from those studies 'which analyze the most elementary complexes in area variation over the world (topical studies) to those which analyze the most complex integrations in areal variation within small areas (regional studies)' (p. 121). Figure 11 suggests that, in regional geography, there would be an emphasis on patterns in the integration of topics in a given area, and conversely, where stress was placed on fewer topics over a larger area, topical geography, the emphasis would be on processes. Because geography cannot be patterns without processes, it follows that geography cannot be regional without being topical or vice versa, and that geography is not dualistic.

For reasons of convenience or simplification, cultural processes, also called "human" or "societal" processes, are often separated from biotic processes and biotic processes from physical processes but, in reality, all processes are so interwoven that one process group cannot be divorced from another. Cultural man, biological man, and the natural environment - all of which are included in the three process groups and which form the cultural ecology - "are intimately interwoven in every aspect of their being" and it is a misleading approach for understanding life on earth to separate one from another (Platt, 1968, p. 354). To distinguish between human and "natural" (all reality less man) factors limits the value of geographic research designed to explain all phenomena interrelated on the earth's surface (Hartshorne, 1959, pp. 48-64; pp. 68-80). Figure 13 shows the three groups of processes as being intertwined and that there is no division between human, biotic, or physical processes; so does Figure 2. Indeed, Nostrand's model illustrates that the dichotomy which is sometimes claimed to exist between human geography and physical geography does not exist in actuality. The interlocking nature of these processes is indicated by a two-way line in Figure 3. In selecting instructional content from geography, it would be unrealistic to view it as a divided field of study.

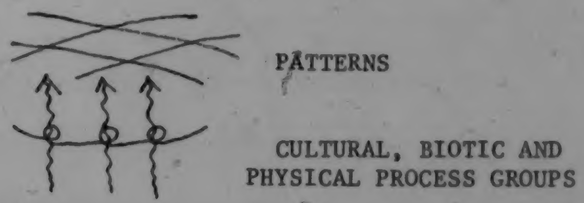


FIGURE 13: Interlocking Nature of Physical, Biotic and Cultural Process Groups (Nostrand, 1968, p. 17).

6. The Concept of Change

Since cultural ecology is both spatial and temporal, geography, though emphasizes a spatial dimension, is historical. That all geography is historical geography is explicit in the manner in which James defines processes and implicit in Nostrand's model (Figure 11), that is, in the way processes are drawn from below. Historical geography 'reveals the nature of the processes at work on the face of the earth' (James, 1964, p. vii). Moreover, when Ackermann (1958, p. 20) writes that the "analysis of distributional change" is one criterion for determining whether geographic research could be considered fundamental, he made clear the essential need for the historical dimension in geography. By defining geography in terms of patterns and processes, all geography becomes historical geography; this is because processes, by definition, involve change, and processes cannot be divorced from patterns.

In observing the "concept of change" Broek (1965) urges those interested in geography to always reckon with change and understand its degree of regularity, its rate, and its direction, Since geography itself is dynamic, there is always the need for reappraisal. 'Even what is called "equilibrium" has meaning only as a temporary phase in the processes of transformation. Thus evolution and revolution, cycle and fluctuation, stagnation and progress, tradition and innovation, retrospect and prospect, are mere variations on the theme of change' (p. 76).

Hill (1972) has proposed the "emerging paradigm of the 1970's" which can be compared with, and in some way developed out of, an earlier paradigm in geography which characterized the field in the 1960's. Hill defines a paradigm as a set of ideas and methods that guide what we do or try to do at any given time. The referents of the previous paradigm 'were "theoretical geography", "the quantitative revolution", "spatial analysis" and that grand and now familiar one, "the New Geography"' (p. 18), which claimed that the quantitative revolution had become conventional wisdom in geography.

In the emerging paradigm, Hill sees the recent geographic research appearing to be very diffuse. It is symptomic of this new diffuseness of research that geographers have intensified their communication with researchers in other fields. The new cross-disciplinary work seems also much more empirical than in the 1960's. Geographic research is characteristically becoming much more applied than it was in the 1960's, and the problem-oriented training which was fundamental to the New Geography of the 1960's helps equip geographers to respond positively to the challenge of "relevance".

To this new paradigm can be added the emerging method of phenomenology (Walmsley, 1974) the purpose of which seems to inject into geography more humanism and subjectivity rather than objectivity (positivism) characteristic of physical sciences. However, the arguments against the use of "scientific methodology" seem to follow the traditional dichotomy between physical geography and human geography and to overlook the proper purpose and use to which this methodology can and has been put without treating man as an "object". Indeed, any methodology could be used by one man to exploit and dehumanize another and vice versa. A methodology is likely to deprive man of his freedoms and opportunities in a situation where "material" rather than man is the central purpose of life.

The concept of change is significant in conceiving of geography as a source of instructional content because geography exists in both real and decision environments. However, the recorded geography takes the characteristics of the decision environment or the static display. For this reason, the contents of the "display geography" must always suffer from obsolescence. Hence, the need for continuous research in the real environment the findings of which can be used as a basis to reappraise the funded geography.

V. IMPLICATIONS OF A DISCIPLINED SYLLABUS

The contents of the present geography syllabus is derived virtually on the assumptions of the "academic rationalists" (Eisner and Vallance, 1974). This philosophy forms the cornerstone of the thinking of people like Phenix, King and Brownell, Hirst and organizations like the Council for Basic Education (CBE) and others who base the "curriculum" on the dictates of the doctrine of formal disciplines or the nature of disciplined knowledge. Thus Phenix (1968) claims that 'all curriculum content should be drawn from the disciplines, only knowledge contained in the disciplines is appropriate to the curriculum' (p. 133). King and Brownell (1966) take the school as 'the home of the ways of knowing and organizing itself to foster and cherish knowledge. Such a role requires it separation from the immediate demands of society from the concrete and practical for it analyzes, criticizes and theorizes' (p. 33). Education, according to Hirst (1965) 'is one that is determined in scope and content by knowledge itself and is concerned with the development of the mind' (p. 125). The CBE (Tanner and Lindgren, 1971) advocates 'a decrease in vocational education at the secondary school level. Vocational courses are without intellectual content and are provided by educationists who have not themselves received a very strong training in the liberal arts' (p. 66).

For academic rationalists, the task of the school and education is essentially to "see" and "theorize" about the phenomena and to transmit the cultural heritage, a "reservoir of funded knowledge" from one generation to the next. The school programs, it is argued, 'should emphasize the classic disciplines through which man acquires since these disciplines, almost by definition, provide concepts and criteria through which thought acquires precision, generality and power; such disciplines exemplify intellectual activity at its best' (Eisner and Vallance, 1974, p. 12).

In connection with the concept sources, it is very important to note the correlation between the assumptions underlying disciplined knowledge and both decision and real environments. A discipline assumes "funding" or accumulation of the already processed knowledge. For knowledge to be recognized as disciplined, it must first be transformed from the real world environment into the decision environment. Anything untransformed by a discipline "specialist" into such knowledge is what Phenix (1968) claims to be 'nondisciplined knowledge unsuitable for teaching and learning' (p. 133). Unlike Lukermann, Phenix defines a discipline in terms of its place in curriculum. The underlying assumption is that disciplined knowledge should necessarily be accepted by an "authority" and recorded in a form of display. Then educational process of teaching and learning should entirely draw its content not from the real environment but from the display which stores the disciplined knowledge. Learners do not need practical experience in transforming real world environment into decision environment because this process is assumed to be the job of a discipline specialist who can successfully fund "pure" knowledge. The notion of division of labour seems to operate. Funding of knowledge is for the specialist (producer) and the learner (the consumer) sees, uses, and theorizes about the specialist product. Theorization and training of the mind becomes mere recapitulation and regurgitation of what the discipline specialist does. Phenix expresses this view when he advocates that 'education should be conceived as guided recapitulation of the processes of inquiry which gave rise to the fruitful bodies of organized knowledge comprising the established disciplines' (p. 136). This is the sort of education which would entirely confine the learner to the transaction with the decision environment rather than the real environment.

Despite their popularity, disciplines *qua disciplines* have no inherent characteristic of making knowledge easy to acquire. In fact, the logical nature of the formal structure of a discipline tends to render knowledge rigid, sterile and difficult to acquire. The rigidity and sterility of disciplined knowledge induces a tendency to unnecessary atomization of knowledge. This is one reason why instructional programs organized around disciplines knowledge have a tendency to too early narrow specialization. Furthermore, suggestions from discipline "specialists" tend to be too technical and abstract and, therefore, unsuitable to those students who require an education of a general kind only.

Studies directed toward the doctrine of formal discipline find that although transfer takes place through the training of the mind, it 'is much more limited than is generally realized. The doctrine of formal discipline assumes a generality of transfer that does not exist. No amount of training increases greatly the individual's ability to reason in general. The gains are specific, and transferable only when the same method of attack facilitates the handling of similar materials' (Seagoe, 1970, p. 184). From these findings it can be inferred that the proccupation with disciplined knowledge is likely to promote convergent rather than divergent thinking or open-ended inquiry.

Since disciplined knowledge emphasizes theoretical rather than practical or vocational experiences, it tends to be divorced from the real life situations of the real environment to which learners belong. Because disciplined knowledge means recorded knowledge or "display knowledge" (funded knowledge), it suffers from the shortcomings characteristic of the display. Thus knowledge in a particular display must always be static in the sense that it refers to a definite moment in or period of time and to a particular place or area. Disciplined knowledge is a direct product of and dependent on the dynamic real environment for its validity and existence. Funded knowledge becomes obsolete as the real situation which it is about in the real environment changes. Since the process of transforming the real environment into the decision environment always involves distortions of reality, and because man has no omniscient powers to predict and control all the factors that might influence his funding process, disciplined knowledge should suffer from some distortions of reality. And all these limitations of disciplined knowledge are also the shortcomings of education which emphasizes book learning.

Secondary school geography syllabus is still largely nutshelled in this sort of educational process which invariably consists of spoonfeeding the young people with lots of "authoritative" knowledge, the education whose preoccupation is overwhelmingly with knowledge category of the cognitive domain, and one which is assumed to represent the end product of scholarship, research and reflection. The outcomes of holding on this way of giving authoritative knowledge to the students is to turn them into robots or passive receptacles. For, education becomes the process of receiving information in the mind, storing it in memory and upon signal, from the teacher, regurgitating it. Much of the information, many of the principles and concepts are learnt in rote fashion and meaningful learning hardly ever takes place. Much of what is passed on are "inert ideas" which cannot be actively accommodated to the learner's experience. This process of education is cyclic and persistent in that it repeats itself. The teacher imparts disciplined knowledge from the display, the student holds it cognitively and reproduces it someday upon demand. The student becomes a teacher and the whole process is repeated.

The purpose of education for self-reliance is to enable students to transact actively with their real environment. Theorization and funded knowledge must be conceived as means to the end rather than ends in themselves. Education must equip students with the skills, knowledge, attitudes and values which are relevant for developing their total environment and understanding what they are at all levels of human existence. This means that schools must not be only places where mere funded knowledge is passed on, but mainly where new knowledge is made. As Ndunguru (Adams, Mmari and Vella, 1972) stresses, our theory of knowledge must not be that of knowledge which must be passed on. This kind of epistemology gives rise to what

Paulo Freire has called the banking concept of education, whereby the teacher deposits knowledge in the learner only to withdraw it on demand. Rather, knowledge should be conceived as something that can be created by the student and the teacher. Education should enbale the learner to contribute something to the universe through transforming the real environment into real products and into decision environment.

As Johnson (1968), Aoki (1970) and other educators have pointed out, a discipline is not the only source of instructional content. Cultural ecology consists of nondisciplined (conventional wisdom) and disciplined knowledge, skills, attitudes and values existing in complex interrelationships. The selection of instructional content only from disciplined knowledge forgoes knowledges, skills, attitudes and values which the authority has not recognized as geographic and yet of relevance to geographic education. For, even conventional wisdom has a spatial dimension. In fact, we seem to forego the wisdom which forms the real nature of man. Disciplined knowledge does consist of content which is irrelevant to our needs and problems. Disciplinary organization of the contents of cultural ecology may also not be a very efficient way of organizing and categorizing learnings for instruction because disciplines impose arbitrary boundaries on the naturally integrated contents of the cultural ecology. Disciplines are indeed "partial sources" of instructional content. It is definitely unrealistic to equate education with disciplines, for they are a part of the entire concept of "education". Program content for instruction should be drawn from both real and decision environments. The extent to which instructional content will be generated from either of these sources should be based on suitable and explicit selection criteria.

CHAPTER III

THE SELECTION OF INSTRUCTIONAL CONTENT

I. NEED FOR SELECTION OF INSTRUCTIONAL CONTENT

The need to change the content of the existing educational programs is one major challenge of education for self-reliance. The task of making the educational programs relevant 'is far from complete. Not all syllabi have yet been changed in accordance with the new policy; not every teacher has yet received the necessary retraining and reorientation' (Nyerere, 1972, p. 97).

Pedagogical and psychological reasons also necessitate continuous selection of instructional content and other program components. One such reason is the explosion of knowledge. New knowledge should not simply be pressed into the program by the addition-reduction-substitution process. To do so will eventuate in the program being amorphous and irrelevant. Knowledge, skills and values are also becoming obsolete. The nature of obsolescence is such that 'the period ahead may involve such a rapid rate of change in specific technology that narrow skills will become obsolete within a reasonably short time after their acquisition' (Bruner, 1966, p. 32). A need exists to select content which will help learners to cope with change. The systems we use to analyze and select instructional content become important not only because they edit the world of change that we present to the learners but also because they shape their thinking process, their conception of phenomena and reality and their personality.

'Planning means choosing' between many desirable alternatives (Nyerere, 1969). A wrong choice of program components is likely to have far-reaching effects on the development of the learner and the society at large. As President Nyerere (1972) puts it, 'wrong education could cause difficulties for the nation as well as for the individual in the future' (p. 27). Appropriate criteria upon which to base the selection process must be specified.

The purpose of this chapter is to investigate and establish some criteria that might illustrate the task of selecting the instructional content for geographic education for self-reliance. A related issue is the current emphasis on the instructional objectives stated in terms of overt, measurable student behaviours. A brief review of important arguments surrounding the definition, identification, and usefulness of behaviourally stated objectives is presented first in order to uncover some basic assumptions underlying the selection of instructional content.

II. DEFINING AND IDENTIFYING INSTRUCTIONAL OBJECTIVES

The definition of instructional objectives is another controversial area in education. One way to define instructional objectives is to identify the behaviour of the learner in terms of observable acts. This definition is based on the notion that the way to determine whether or not a student has learned something is to observe the outcome of his behaviour. These outcomes have been conventionally referred to as "behavioural objectives" or "terminal behaviours" or "terminal performances".

Mager (1962) defines behaviour as 'any visible activity displayed by a learner (student)' (p. 2). Terminal behaviour 'specifies what the learner must be able to DO or PERFORM when he is demonstrating his mastery of the objective. Since no one can see into another's mind to determine what he knows, you can only determine the state of the learner's intellect or skill by observing some aspects of his behaviour or performance (the term "behaviour" as used here, means overt action)' (p. 13).

Another set of objectives is termed "nonbehavioural statements" of instructional objectives because the terminal performances are not specified and because the performances implied are interior states, responses and processes not open to observation (DeCecco and Crawford, 1974, p. 28).

The distinction between behavioural and nonbehavioural statements lies chiefly in the choice of verbs. The behaviourally stated objectives use "action verbs" such as to write, to recite, to identify and to construct because these are publicly observable or overt behaviours. The nonbehavioural statements use "covert" verbs such as to know, to understand, to appreciate, to grasp the significance of, to enjoy, to believe, and to have faith in. Mager labels such verbs as "loaded words" which are open to a wide range of interpretation. These do not indicate how the student will visibly show his understanding or appreciation much of which is neural and celebral activity hardly open to observation and measurement.

Usefulness of Objectives Stated in Terms of Overt, Measurable Behaviours of the Student

The advocates of behaviourally stated instructional objectives (Tyler, 1950, 1964; Mager, 1962; Gagné, 1964, 1965, Popham and Baker, 1970; Worthen and Sanders, 1973) at least provide three persuasive reasons for the careful definition of objectives.

First, such a definition provides guidance in the planning of instruction. If you are not certain where you are going, you may very well end up somewhere else. To achieve clarity of purpose and direction the programmer must determine at the start what the students will be able to do at the finish. For this reason, uni-linear model of program development and implementation has become popular (Glaser, 1962; Popham and Baker, 1970; Thornburg, 1973; DeCecco and Crawford, 1974). This model essentially begins with identifying behavioural objectives followed by identifying entering behaviour, followed by developing a teaching strategy and ends with evaluation.

Second, behaviourally stated objectives are useful in performance assessment. This concern is discussed in Chapter six. Thirdly, if students know beforehand what they must learn in any given activity, they can better direct their own attention and efforts. Mager and McCann (DeCecco and Crawford, 1974, p. 31) provide an empirical support for the benefits students derive from knowing at the start the specific objectives they should attain.

In their study they found that the training time for the experimental group which was presented with a detailed list of the instructional objectives was 75 percent less than that for the control groups without any loss in achievement. Motivational benefits including students' frequent enjoyment of the feelings of success and accomplishment and reinforcement are other cited advantages of this approach (Charles, 1974, p. 26).

Elements of Objectives Stated in Terms of Overt, Measurable Behaviours of the Student

The most specific behavioural objective would contain the following elements (Clegg, 1970; Popham and Baker, 1970; Kapfer, 1970; Mager, 1962):

1. The person who is to perform the particular learning behaviour (for example, the student, the learner, the class). Popham and Baker (1970) refer to this element as 'the target population of the learners' (p. 43).
2. The specific behaviour required to demonstrate accomplishment of the objective (stated in terms of "strong action verbs") (for example, to construct (a model), to locate (countries), to draw (a map)). This is regarded as the most important component (Kapfer, 1970; Charles, 1972).
3. The subject-matter content or product by which the accomplishment of the objective can be evaluated (for example, a statement of fact or generalization, a contour map, a simple grid system).

4. The conditions under which the behaviour is to be performed (for example, with the aid of an atlas, using data from the 1967 census). This element constitutes the instrumental content.
5. The criterion or standard used to evaluate the accomplishment of the performance (for example, correct to the nearest mile, four out of five (reasons) correct, the task is to be completed within 30 minutes).

Using this format a behavioural objective in geographic education might thus be stated:

> Given data from the 1957 and 1967 census, the student in Form 1 will be able to construct a bar graph showing the change in population for the following towns: Tanga, Kigoma, Bukoba and Lindi. Data will be correct to the nearest ten thousand.

From this format, the basic assumptions of writing behavioural objectives are clear. Exact specifications help to delimit the scope of available content and require that programmers make explicit decisions about what to include and what to exclude. Such explicitness also makes the learning process and its outcomes open to inquiry so that both objectives and methods can be modified if outcomes are not achieved. These objectives contain the elements needed for evaluation of the learning outcomes in the initial definition of the task.

Limitations of Objectives Stated in Terms of Overt, Measurable Behaviours of the Student

One basic argument against the use of behavioural objectives is that they limit achievement by putting ceilings on student aspirations and by not encouraging unexpected or creative responses. It is even impossible to list and describe fully all the particular behaviours desired (Ebel, 1963, pp. 28-44). In complex subject matters and skills, behavioural objectives may be neither possible nor desirable. 'In the arts and subject matters where, for example, novel or creative responses are desired, the particular behaviours to be developed cannot easily be identified. Here curriculum and instruction should yield behaviours and products which are unpredictable. The end achievement ought to be something of a surprise to both teacher and pupil' (Eisner, 1972, p. 25).

Advocates of behavioural objectives argue against this by saying that 'attainment of objectives does not reduce student aspirations. To the contrary, success is highly motivating. Further, the act of making divergent (creative) responses can be stated in behavioural terms. Example: the student can describe three unusual uses for a plastic comb' (Charles, 1972, p. 56).

Eisner also questions the belief that behavioural objectives can be used as criteria by which to measure the outcomes of the curriculum and instruction. He argues that there is a vast difference between making a qualitative judgement and applying an objective standard. We can make a behavioural judgement of a piece of writing in terms of grammar, syntax, and even logic. But what shapes our preferences for literature or writings is the result of the aesthetic impact of content and style - a qualitative judgement that varies with individuals and times. It is often the uniqueness of what the writers say and do rather than their conformity to a standard that gives their writing literary and artistic value. As such not all outcomes of a program and instruction are amenable to measurement.

Eisner (1972) also questions the assertion that behavioural objectives must be identified at the start. He distinguishes between the logical and psychological development of a course of study. Although it seems logical that a person should know where he is going when he embarks on a trip, it is often not the most psychologically satisfying way to travel. It is often more exciting to leave some of the itinerary unplanned or to change it when more interesting alternatives are discovered.

Aoki (1974) questions the notorious stance of uni-linear programming and the tendency to reduce instruction to the testable. Some existential relationship between student and teacher must be established to allow learning to be experientially exciting and meaningful. With such a situation it may well be that uncertainty, unpredictability and uncontrolability are critical ingredients of excitement.

Aoki makes a case for objectives to be viewed as manifestations of transactional modes, that is, modes of being-in-the world as each student transacts with his significant action world. The critical feature of this orientation would not be detachment between the learner and the teacher resulting from emphasis on objectification, but rather intersubjective, transactive interdependence of teacher on student and student on teacher. Here it may be more significant to look not at human behaviour as such but rather at human acts. Unlike the views which equate behaviour with acts, Aoki makes a distinction between them. Typical behaviour is viewed as a link in a causal or functional chain possessing antecedents and determinants, whereas acts can be viewed as being intentional, goal-directed or aimed at something, and as representing a life plan of some sort. He suggests that another way of specifying the outcomes of instruction, which departs from the notorious stance of unilinearity, detachment and objectification, may be in a structural analysis of an anticipated "instructional dialogue", that is, an analysis of instructional situations including both the intended and unintended outcomes. Hence, an alternative way of describing objectives may be to typify the transactional phenomenon of a person's life-mode.

Another argument is that specific objectives lead to triviality. That which can be stated in behavioural terms tends to be greatly unimportant. Advocates of behavioural objectives reply to this argument by claiming that 'discussions about the "importance" of intangibles (for example, patriotism, aesthetic appreciation) are nonproductive. Important or not, one can never know whether an intangible objective is reached, so it is far better to concentrate on the attainable' (Charles, 1972, p. 56).

Kurfman (1970) finds one major difficulty in writing behavioural objectives to be 'the time that must be invested in formulating each objective' and 'redundancy is one of the impressions created by objectives stated in this fashion' (p. 9). 'There is also the danger that an excessive emphasis on such detailed objectives will encourage teachers to focus so much on the trees that they fail to see the forest' (p. 10).

There seems to be no objection to conceiving of instructional objectives in terms of students rather than what the teachers will do. That objectives at all levels of generality should be formulated in terms of observable, measurable student behaviours remains a controversial proposition. Some educators (Kurfman, 1970) have suggested that behavioural objectives should not necessarily imply overt action on the part of the learner. Students cannot be expected to demonstrate the attainment of an objective by always doing something observable in the school environment, the home, or the community.

Although this dispute among educators concerning the statement and usefulness of instructional objectives stated in overt, measurable behaviours is cited here, it will be referred to throughout later discussions. Some educators in our country have advocated the use of objectives stated in this fashion. This review will probably serve as a basis for rethinking about the advocacy for such objectives. Some implications of this type of objectives will be observed later especially in relation to the concept "behaviour" and to evaluation.

III. SELECTION CRITERIA

Three criteria do always and simultaneously determine the selection of instructional content for the school program: first, the learner's needs and capabilities and how he learns; second, the society's needs and its demands on the schools; and third, the nature of available skills and knowledge, in both funded and unfunded forms. Educators have either implicitly or explicitly recognized and used these factors as selection and organizational criteria not only of content but also of other program components (Hanna, 1966; Gardner and Rogers, 1960; Fenton, 1967; Johnson, 1968; Aoki, 1970).

Despite the assertion that studies of the learners and those of the society are sources of instructional content, Tyler (1950, 1964, pp. 79-83) actually illustrates that they are not. Tyler (1950) writes: 'An investigation of children in the elementary school in a certain community may reveal dietary deficiency and inadequate physical conditions. These facts may suggest objectives in health education and in social studies' (p. 6). Thus health education and social studies become the source of objectives and dietary deficiency acts as a selection criterion. Tyler considers these studies in terms of a "gap" between what is and what should be:

'Studies of the learners suggest educational objectives only when the information about the learners is compared with some desirable standards, some conception of acceptable norms, so that the difference between the present condition of the learner and the acceptable norms can be identified. This difference or gap is what is generally referred to as a need' (p. 6). In this sense the "needs" of the learner are the gaps between what he is and what he ought to be. A second conception of the "needs" is the psychological sense of the tensions within an individual which must be brought into equilibrium if the individual is to live normally.

Tyler (1950) further illustrates that these gaps or needs are selection criteria when he states: 'Hence, studies that identify these gaps, these educational needs are necessary studies to provide a basis for selection of objectives which should be given primary emphasis in the school's program (p. 8). As Johnson (1968) states, 'The ideology of the society determines what additional criteria are imposed in curriculum selection. A given society may demand that curriculum be selected in conformity with a specified set of political, social, economic, or moral values', 'or with regard to its utility in the social order in the present or anticipated life situations of learners' (p. 49). Helburn (1972) also emphasizes that 'social, economic, and political values impinge on curriculum development both in the choice of subject matter and in the kinds of classroom process encouraged' (p. 50). Thus Tyler's discussion on the needs of the learner and studies of contemporary life is not at all about the source of instructional content, instructional objectives included, but about the criteria for selecting content and some other program components.

That Tyler suggests the subject matter specialists as a source of instructional objectives is an indication that his entire rationale bases on academic rationalism and its concomitants. What Tyler is in fact saying is that by using the data from the two types of studies, schools must only select instructional content from the knowledge funded or contributed by the discipline specialists. Kliebard's (1975, p. 73) stipulation that subject matter is not a "source" of instructional content but mainly one of several means by which one fulfills individual needs such as vocational aspirations or meets social expectations is rather confusing possibly because Kliebard does not establish what the "source" is. Moreover, the source is also a means to an end. Subject matter is also a source of the instructional content, though a partial one. The problem in education is primarily not whether or not disciplines should act as a source, but the mode by which this source is availed to and used by schools in teaching and learning processes. Why should students be controlled and forced to learn specialist knowledge and not have opportunity to create it themselves and be equipped with tools to criticise someone else's truth? Why should students not be taught how to select whatever facts, concepts and principles are appropriate to their needs and problems? Why academic rationalism? Such are in the writer's mind the key questions to ask.

IV. RELATIONSHIP AMONG NATURE OF THE SOCIETY, OF THE LEARNER AND OF THE DISCIPLINE

Our present philosophy of education in Tanzania assumes that education should be the means of preparing the young people for life in a society which is predominantly rural and which has chosen democratic socialism and self-reliance as a way of life; hence education for self-reliance. The concept of "self-reliance" might be understood by asking the following questions: What is self-reliance? What is a self-reliant society? What is a self-reliant individual? How does a self-reliant individual fit into a self-reliant society?

1. Concept of Self-Reliance

President Nyerere (1968) defines self-reliance when he states that "Independence is self-reliance". Self-reliance can be conceived as the quality of an individual, or group of individuals who depend upon their own resources for development. In this sense, education for self-reliance is education for action directed towards the development of Tanzanian society. We won, through independence, 'the right to work for ourselves, the right to design and build our own future' (Nyerere, 1974, p. 138). 'We have agreed that our nation shall be a nation of free and equal citizens, each person having an equal right and opportunity to develop himself, and contribute to the maximum of his capabilities to the development of our society' (Nyerere, 1967, p. 139). 'We have to build Tanganyika ourselves, primarily with our own resources and by our own efforts' (Nyerere, 1967, p. 139).

Self-reliance must ensure that each and every Tanzanian citizen is conscious of his obligations towards society, and that he reaps benefits which are commensurate with the efforts he makes to increase the common good of the nation.

Reliance upon self does not preclude cooperation with other humans and other societies. The achievements of humanity the world over are the inheritance of mankind, which any man and any society would be foolish to ignore. The sharing of knowledge and experience and wealth is a good and normal thing provided that the contributions of others increase, rather than decrease, our freedom of thought and action. Assistance of any kind must be consistent 'with our commitment to Tanzanian freedom and to the freedom and humanity of all citizens' (Nyerere, 1968. p. 317).

2. A Self-Reliant Society

A self-reliant society is one which maps out and realizes its own destiny. The basic conditions for Tanzania to become self-reliant include our ability to choose our own political policies; a government which represents the will of the people; an economy which is based on local resources; and a people who will always be ready to defend their nation and who can work hard and provide good leadership (Nyerere, 1968. pp. 234-47).

3. A Self-Reliant Individual

A self-reliant individual is one who has the responsibility of developing his own talents and placing them at the service of the community. A self-reliant individual is basically one who (a) believes in the dominant, yet dynamic values of his society; (b) wishes to serve his country; and (c) works intelligently to the maximum of his ability (Nyerere, 1967; 1968).

In connection with these qualities of a self-reliant individual, Auger (1970, p. 29) stipulates that a self-reliant person is the product of self-determination, self-realization, and self-integration. Self-determination means that one has accepted the responsibility of making his own future, and the future of other men. Self-realization means that each individual realizes his own responsibilities, and that his own self-realization has to be conceived as brought about and exercised in relationship to society. Self-integration means that every person has to decide what values shall dominate and guide his efforts to self-realization. Without an integration factor - a set of values - a person is likely to dispense his energies without ever making up his mind about his future and the future of others. Self-integration corresponds to (a) above, and self-determination to (b) and self-realization to (c). Indeed, all these are among "higher'order" needs along Maslow's hierarchy of basic human needs.

4. How a Self-Reliant Individual Fits Into a Self-Reliant Society

President Nyerere (1968) thus illustrates how an individual fits into a self-reliant society: 'If every individual is self-reliant the ten-house cell will be self-reliant; if all the cells are self-reliant the whole ward will be self-reliant; and if the wards are self-reliant the District will be self-reliant. If the Districts are self-reliant, then the Region is self-reliant, and if the Regions are self-reliant, then the whole nation is self-reliant and this is our aim' (p. 248).

This statement connects with the concept of "common good" (Auger, 1970). The common good is the greatest of individual goods; that is, an individual cannot fully realize his potentialities unless he is seriously engaged in societal life. Left to his own devices, in the sense of alienation par excellance, an individual would achieve very little under any circumstances. He is in need of society to realize his personality. The common good does not mean that individual excellence should be minimized or thwarted. The common good would suffer from such dimunition. It means that every individual should have an equal opportunity to develop his potentialities so that he can maximize his contribution to the common good, and expect a return which is commensurate to his efforts and good will rather than the gratuities of nature. It is when individuals seek to build up an excellence at the expense of the common good and of their fellow men that there is no possible reconciliation between the two.

It can now be seen that the philosophy of education for self-reliance is a key component of the entire national philosophy of democratic socialism and that for a geography program to be relevant, it must be determined by this ideology. Failure to do this is to ape the ideologies of other people and, hence, to alienate our young people.

Concept of Relevance

The most basic quality of education for self-reliance is that education must be relevant to the people for whom it is intended, as well as to the society and environment in which they will be living. Ndunguru (1972) conceives relevance as connoting "connectedness with" and the degree of connectedness may be close and direct or remote and indirect. Further, "relevance" implies utility. In the final analysis relevant education is that whose content and method connect in some way with the needs and aspirations of a given society, in such a way it can be used for understanding and advancing that society. Understood thus, the mere labels of the content items of education are poor indicators of the degree of relevance of that education.

Metcalf and Hunt, (1970) believe that a program 'acquires relevance whenever it impinges upon what students believe, and whenever it has the effect of producing a pattern of belief that is well grounded and internally consistent' (p. 358). Gibson (1968) believes that for instructional materials to have genuine relevance for the teacher and the learner, they 'must be authentic, must permit student engagement in the teaching-learning process, must reflect the social realities of the community at large, and must provide for teacher and student involvement in the preparation of much of the materials' (p. 186).

Broadly interpreted, relevance subsumes specific selection criteria and implies that the needs and problems of the learner and those of the society are not a dichotomy. The inseparability of these needs and problems is in conjunction with the fact observed earlier that an individual cannot fully realize his potentialities unless he is seriously engaged in societal life. Metcalf and Hunt (1970) explicate this viewpoint when they write: 'It is more relevant to engage young people in a study of the problems of the larger culture in which many of their personal problems have their origin. The culture of most significance to the young consists of those aspects that are problematic - that is, the large conflicts and confusions which translate into conflicts and confusions of individuals' (p. 361). Some educational literature and models tend to give the impression that the problems and needs of the learner and of the society are distinct and detached entities. In reality, however, every individual's problem or need is a society's need or problem. Society's needs and problems are the sum-total of the needs and problems of the individuals who make that society to exist and to assume particular characteristics.

In connection with the selection of instructional content and in terms of the way an individual fits into the society, one might view the nature of the society as a "macro-category" and the nature of the learner as the "micro-category" of needs and problems which determine program components. Thus, rather than conceiving the learner and society as detached entities, the "macro-micro" distinction enables one to view them in terms of man-in-society being considered at individual and group scales. The discipline automatically falls under macro-level category for, at this level, the discipline can be seen as formal and conventionalized tool by which cooperative efforts and compromise among the individuals interested in that discipline can be maintained. Furthermore, the nature of a discipline is an external condition to the learner; it is part of the learner's environment to which he has to act upon.

IV. SELECTION CRITERIA UNDER MACRO-CATEGORY

The nature of the society and the nature of the discipline constitute the criteria under macro-category. Such criteria for selecting relevant instructional content might include social realities, teacher's values and preferences, comprehensiveness, significance and balance between depth and breadth.

1. Social Realities

The instructional objectives and the instrumental content selected should portray as realistically as possible the past, present and future values, needs and problems of our society.

Instructional content must be determined by social, economic and political life of Tanzania. It must enable students to become self-reliant citizens.

In view of the fundamental principles of democratic socialism and the predominantly rural character of the people and their total environment, 'publicly provided "education for education's sake" must be general education for the masses. Further education for a selected few must be education for service to the many' (Nyerere, 1968, p. 281). Like most developing countries, Tanzania's major problems include poverty, ignorance and disease. A relevant geography program should face the challenge of alleviating these problems. Students should be able to identify the causes and effects of societal problems and to engage in serious rather than romantic thinking about the ways and means of tackling them through intelligent and economical use of our resources. They should be able to discover how resources might be used to solve problems and to satisfy human needs and to make relevant decisions in accordance with national and international demands and trends. Students should as well participate in solving these problems as they learn.

Rapid change is another societal reality of the contemporary world. The present aspirations and needs will change and new problems will arise. The future problems might prove even more complicated than the present ones. The instructional content selected must help learners to develop an understanding of the concept of change, an ability to solve problems introduced by change and thus to cope with change. They should be able to initiate change, to expect change and react appropriately to given changes in their cultural ecological environment.

Selecting instructional content which is commensurate with the realities of the society should not be equated with such words as "local" or "parochial" or "myopic". Our policy of non-alignment, the need to learn from what others do, the inevitable circulation of people and their contacts with other cultures, interdependence of nations, the need for international understanding and relations, all suggest that it would be futile to advocate isolationism and cultural ethnocentricity. Insistence on relevance and commitment to the needs of society should not imply advocacy for parochialism or myopism and superficiality. While recognizing our special needs and the necessity to have our programs meet these needs, we must not allow our education to be so narrow as to make social and cultural mobility impossible. The implication of the idea of relevant program is that a major task of the programmer is the careful choice of relevent content. We have to ask ourselves why we have for years taught the Rhine lands and sheep rearing in South Africa and foregone Latin America and goat rearing in Tanzania.

Often the content selected is based on the assumption that because such and such instructional content has always been included in the program, it should therefore continue to be included. This tradition, however, is a poor guide for content selection. Content that was pertinent and useful for learning in the past may no longer be the most useful for the learning of the present students whose lives will extend into the twenty-first century. No content should be retained in the program merely because it has "always" been there. Nor should new content be rejected or included simply because it is new. Instead, we need a continuous review and evaluation of the instructional content in order to select that which will most effectively aid the students to learn about themselves and the realities of their society and other humans. Instructional content should shed light on today's problems and open vistas for tomorrow.

2. Teacher's Values and Preferences

A teacher's value system regarding the instructional content to be treated and the learner's behaviour and acts he hopes will emerge in connection with that content is one criterion usually considered as important in the selection of instructional content. Certainly, every teacher, like any other programmer, has his own conception of what ought to or will be done in his field. Secondary school teachers strongly associated with particular subject fields have fairly firm commitments to certain content or competencies in connection with their subject fields.

Teacher's values and preferences for particular kinds of instructional content may affect not only the functional knowledge which learners acquire but also the thinking processes they develop. When teachers repeatedly stress certain sides of topics, learners come to regard these sides as the most important ones, the ones to be looked for in new topics. Students brought up in Regional Geography tradition, for example, are likely to have the tendency for developing a list of questions and criteria for selecting and organizing learnings and their thinking according to the fixed formula of relief, climate, vegetation, transportation, occupations, history, and the like. It can thus be assumed that content, when taught, gradually instills in the learner the same thinking processes that directed the teacher to that content (Bruce, 1965, pp. 69-70).

As Skinner (1973) points out, however, the teacher is not always in a better position. Oftentimes education has gone out of date as some teachers have continued to teach contents which were no longer relevant at any time in the student's life. Such teachers often teach simply what they know or tend to teach what they can teach easily. This practice is usually reinforced by teacher invisibility. Teacher's current interests and preferences, though an inevitable determinant of instructional content, may not be a reliable guide. Teacher's and any other programmer's values, interests and preferences should determine instructional content in conjunction with other, more explicit criteria.

3. Validity

There are two aspects of validity as here used. First, validity implies authenticity, that is, the extent to which the instructional content conveys accuracy and balance to the learners.

Of course, no objective and material can be absolutely accurate in the sense that it is perfectly "free from mistake or error". But, certainly the content selected should reflect a very high degree of accuracy. It should reflect contemporary research, knowledge, skills and attitudes and thus avoid obsolete content. Obsolescence of knowledge, skills and attitudes necessitates the programmers to keep themselves informed of developments in the field of geography and other fields to which it is related, and in the field of education.

The principle of "balance" holds that instructional content should reflect various sides to a question or issue at hand (Gibson, 1968). If students are to study the city of Dar-es-Salaam or New York, for example, they need to see the slums as well as the shiny buildings.

Balance, though usually equated with objectivity, does not imply "value free" content matter, for any producer conveys some of his own value orientations along with the development of his materials and objectives. By balance, it is meant giving the learner an opportunity to read, see, feel, and hear more than one side of an issue. However, at times it may even be valuable to see different points of view from unbalanced items particularly when dealing with controversial issues.

The second connotation of validity applies to instrumental content. Instructional materials are valid if they promote or instrument the instructional objectives that they are intended to promote. If the instructional materials do not instrument the intended learning outcomes, they are irrelevant for that activity. Data relevant to the problems that have to be investigated by students is a key requirement of inquiry.

4. Comprehensiveness

Comprehensiveness means that the selected instructional objectives and instrumental content should represent all learning outcomes of the instructional area. The instructional content selected must include learning outcomes of all types and at all levels.

Taxonomies have been developed that provide a systematic and fairly comprehensive listing against which to check the objectives and materials that may be included in the program. Besides Bloom's (1956) taxonomy of educational objectives in the cognitive domain and Krathwohl's (1964) taxonomy of educational objectives in the affective domain, Armstrong, Kibler and Dave (Thornburg, 1973) have attempted to identify educational objectives in the psychomotor domain. Gagné (1964; 1965) has developed hierarchical classes of behaviour or learning types. Although Gagné refers to these classes as learning types, he is primarily interested in the observable behaviours and performances which are the products of each such class.

Taba (1966) identified three levels of cognitive tasks: Concept Formation, Interpretation of Data, and Application of Principles. The "list group and label" activities of Cognitive Task I include observing, identifying, categorizing and defining. The processes of comparing and contrasting and generalizing are included in Cognitive Task II. Cognitive Task III incorporates the predicting and verifying of predictions. James Hill (1970, p. 308) has synthesized Taba's cognitive tasks and Gagne's "learned intellectual capabilities" into a hierarchy of inquiry processes shown in Figure 14. It will, however, be shown later that these taxonomies have their limitations.

(i) Processes as Content

The present emphasis on teaching and learning "processes" as content arises out of the futility of conceiving the content of educational programs as merely consisting of the compendium of information comprising the instructional materials for a particular course or a given form (grade) level.

FIGURE 14: HIERARCHY OF INQUIRY PROCESSES (After Gagné)

Making Decisions
Testing Hypotheses
Formulating Hypotheses
Developing Models
Verifying Predictions
Predicting
Generalizing
Comparing and Contrasting
Defining
Identifying Categories
Observing

N.B.: Each level subsumes all levels below it and is subsumed under each level above it in the hierarchy of cognitive processes depicted on the chart.

Burns and Brooks (1970) define processes as 'a type of objectives which are specific mental skills which are any of a set of actions, changes, treatments, or transformations of cognitive entities used in a strategy in a special order to achieve the solution of a problem associated with the learning act, the use of learning products, or the communication of things learned. Processes are, more simply, transformational entities' (p. 10). Since processes are complex skills which learners use in transforming knowledges and understandings in order to effect solutions to problems, they could be called "problem solving skills". They are mental skills needed in any problem solving situation associated with learning, using what has been learned, or communicating about things learned. The following terms typify what is meant by processes:

1. Abstracting
2. Analyzing
3. Classifying
4. Equating
5. Evaluating
6. Generalizing
7. Inferring
8. Sequencing
9. Simulating
10. Synthesizing
11. Theorizing
12. Translating

Each of these process terms is in reality a category name for a sub-group of synoptic or highly correlated terms. For example, simulating is also affecting, assuming, copying, counterfeiting, faking, imitating, making believe, mocking, pretending, and shaming.

Where the primary emphasis is upon subject matter content already structured and known, the learner ordinarily functions in the passive mode. Where the stress is upon process learning, greater importance is attached to student thinking and active learning (Paker and Rubin, 1968). This is in line with Bruner's (1963) distinction between expository mode and hypothetical mode. Process acquisition change the learner's ability to cope with situations in the future - he learns to transfer to real situations. Process are thus important objectives for a program in a period of rapid change (Biggs, 1972).

Properly interpreted, education for self-reliance emphasizes process learning rather than information learning and mere assimilation of knowledge. It demands that students should be equipped with problem solving skills, concept formation skills, data-processing skills, the ability to make judgments and discriminate, the ability to relate causes to effects, the ability to analyze, the ability to summarize, and the ability to form valid conclusions. It is through process learning that a student can develop an inquiring mind or critical thinking by applying knowledge to solve problems rather than learning by rote. A relevant geography program must be process oriented if the learners are to develop processing behaviours and actions so that they can become productive citizens able to initiate innovations, to develop self-confidence, and to transform our available resources into usable goods and services. Information should be used as a means rather than as an end in itself.

(ii) Affective Objectives and Interlocking Nature of Domains

Processes emerge from a learner who has attitudes, beliefs and well-established coping patterns. Thus, in addition to process learning, students should deal with affective objectives. The affective factors, also termed neocognitive, noncognitive, nonintellective factors or motivational variables do to some extent determine what is learned in the cognitive domain. Attitudes are learned and become the function of the mind; and, therefore, they may best be conceptualized as having all three components, or domains of the mind within them - affective, cognitive and behavioural. For example, when an affective attitudinal response is being made, the individual's nervous system becomes highly active, and there is a strong "feeling" component to the response. When a cognitive attitudinal response is made, it is more perceptual; the individual is expressing a belief that he has intellectually worked through. Therefore, while the expression of attitude is affective, it has a stronger "thinking" than "feeling" component. A physical attitudinal response is usually expressed through overt action or through statements indicative of such action. Attitude learning depends primarily on the affective thrust and on the cognitive thrust (Thornburg, 1973, pp. 283-284). The interactional character of these thrusts is indicated in Figure 15.

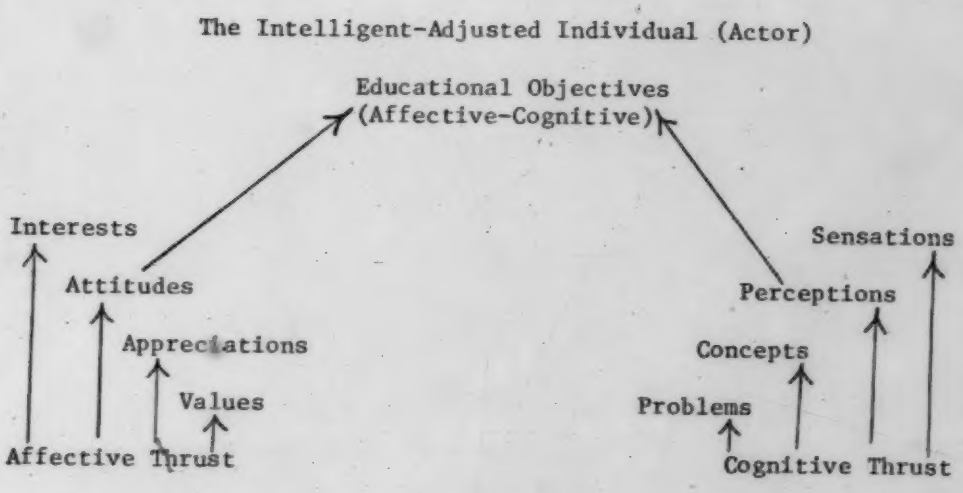

The Intelligent-Adjusted Individual (Actor)
Educational Objectives
(Affective-Cognitive)
Interests
Attitudes
Appreciations
Values
Affective Thrust
Sensations
Perceptions
Concepts
Problems
Cognitive Thrust

FIGURE 15: Attitude Learning and the Affective and Cognitive Domains (Thornburg, 1973, p. 284).

Both the direction of the affective, whether positive or negative, with reference to an object, person, event, and the strength of the affective, determine to an extent the cognitive structure and whether new information will be processed or blocked. The influences of the affective state on thinking may be viewed as those which facilitate and assist the process and those which inhibit learning or distort it. Thus, another way of conceptualizing the interaction of affective and cognitive components is to view each of the several affective variables along a continuum moving from low through optimal to high strength as illustrated in Figure 16 (McCartin, 1969, p. 247).

As conflict increases from low to optimal, so does the performance rate. Beyond a given range conceptual conflict becomes too high in strength and performance decreases. Whether or not learning will occur and, if so, how effective, will depend to a great extent upon the learner's tolerance for conflict.

Even instructional objectives in the psychomotor domain typically include concomitant cognitive and affective elements, but the demonstration of a motor skill is the dominant characteristic of the student's response (Gronlund, 1970, p. 24).

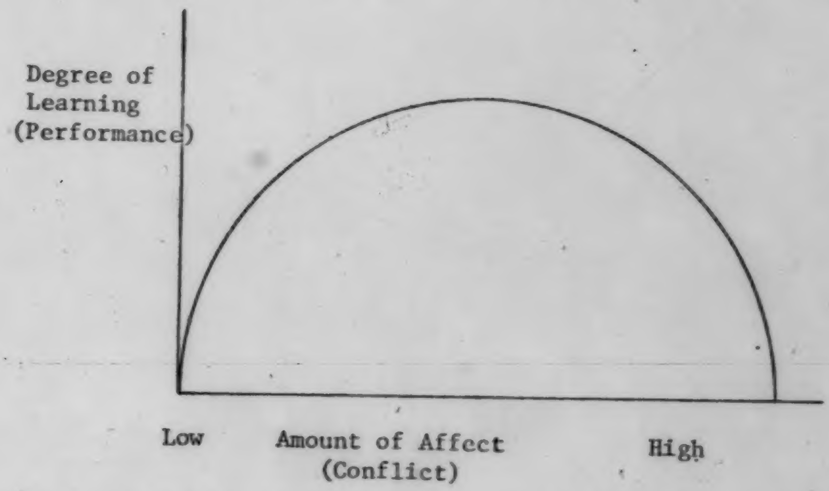


FIGURE 16: Interaction of Affective and Cognitive Components

Due to the interlocking nature of domains, taxonomies of educational objectives overlap. The overlapping of these taxonomies may explain the danger of detaching that which cannot be detached. The three domains 'are segmented artifacts of a conceptual scheme and, although they may be useful in conceptual analysis, in reality they are all of a piece' (Aoki, 1974, pp. 91-92). 'The three domains of the taxonomies provide a useful classification system, but they simply represent particular emphasis in stating objectives and not mutually exclusive divisions' (Gronlund, 1970, p. 24). For the sake of conceptual scrutiny, it is permissible to tease apart the domains but in practice, we should keep soundly in mind the interrelation of these components and the overlapping within and between taxonomies. No single taxonomy is comprehensive enough to guide the selection of all desired instructional content. The selection process should be based on as many available taxonomies as possible and on the recommendations available in educational literature. In fact, in an educational orientation in which students are involved in identifying goals and objectives and problems to investigate, such ready-made taxonomies may be of very little or no value at all.

5. Significance

Usually, the criterion of significance is equated with the structure of the discipline. That is to say, significance is often used to mean identifying the key concepts and principles or fundamental ideas which constitute its structure. It is then assumed that these fundamentals of the discipline or funded knowledge can be used to select the instructional content.

Does the discipline of geography have one single and final structure? Does non-funded learnings (conventional wisdom) have a structure? Literature on the structure of geography confirm that there is no such a thing as a single, fixed and final structure, but there are "structures" of geography. What is a "structure" anyway?

From the point of view of the nature of a concept (Beyer and Penna, 1971) the process of structure formation can be equated with the process of concept formation. Concepts differ in the size of the area they embrace. While some cover a wide spectrum, others cover a relatively small field. For this reason, a particular concept may be part of another even larger concept. What one eventually has is a hierarchy of concepts, all of which may be interdependent (Newton, 1968, p. 42).

For instance, "landscape" (Beyer, 1971) is a concept or a mental image which includes man-made features and natural features. Although "landscape" is a concept, the man-made and natural features are more than facts *per se*; they, too, are concepts subsumed within a larger concept and subsuming other concepts. The concept that we call landscape is the interrelations between these branches. Thus one can literally create a flow-chart (Figure 17) of concepts under the original concept of landscape.

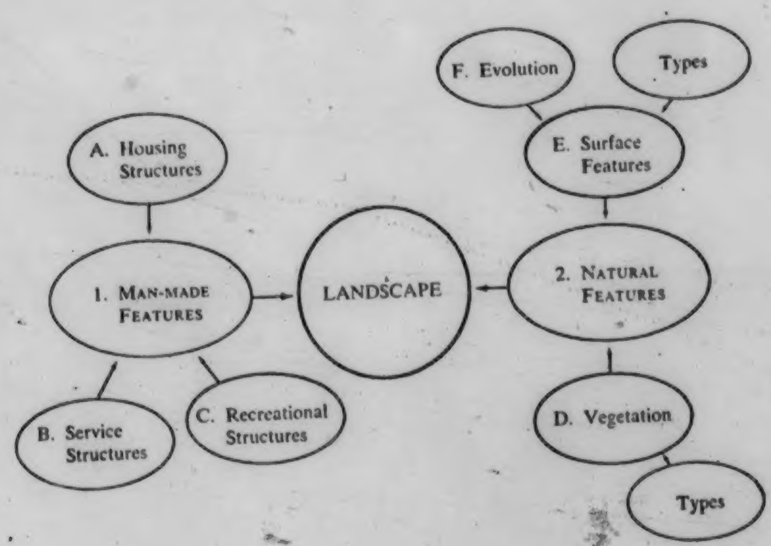

F. Evolution
Types
A. Housing Structures
E. Surface Features
1. MAN-MADE FEATURES
LANDSCAPE
2. NATURAL FEATURES
B. Service Structures
C. Recreational Structures
D. Vegetation
Types

FIGURE 17: A Concept of Landscape (Beyer, 1971, p. 122).

The chart above confirms the notion that a concept is 'a network of inferences that are or may be set into play by an act of categorization' (Bruner, 1956, p. 244), and that this network is a hierarchical structure of concepts. It is along these lines that Bruner (1962) states that 'Grasping the structure of the subject is understanding it in a way that permits many other things to be related to it meaningfully. To learn structure, in short, is to learn how things are related' (p. 7).

The hierarchical structure of concepts is the basis for all taxonomies of educational objectives. For, the term "taxonomy" is used in preference to "classification" because the object is not just to sort out behaviour into groups, but into classes of behaviour in an ascending order of mental phenomena. Thus decision making is placed higher in the taxonomy than the recall of information. There cannot be a single, fixed and absolute structure of geography because 'no one is clear of the idea of a hierarchy of concepts' (Newton, 1968, p. 42). Like taxonomies of educational objectives, hierarchical structures of disciplines are subjective. Individuals who identify these structures have unique ways of perceiving, conceiving, discriminating, and categorizing components or phenomena which compose their structures. For instance, while Thomas (1964) and Greco (Senesh, 1967) include "geographic facts" in their structures, Lukermann (1964, p. 167) believes that geography is a catalogue of questions, not the phenomena, not the facts, not the method are geographic. And although Thomas' geographic facts and spatial distribution subsume "location", Picker's (1965) conception of location subsumes distribution, concentration and centralization. Unlike these writers, Broek (1965) includes "the cultural appraisal of the earth" in the list of basic concepts. "Globalism", "resource and man the chooser", "perpetual transformation", "the round earth on flat paper", and "the life-layer" are among Warman's (1966, pp. 313-319) concepts of his conceptual framework of geography.

Funded structures of discipline, topics and phenomena can be conceived as the products of our "cognitive structures" (Ausubel, 1968), that is, our existing organizational properties of prior learnings. The properties 'include the hierarchical structure of those learnings - the "big ideas" or principles acquired, and their relationship to supporting lesser concepts or facts. These properties include also the clarity of structure, its stability, inclusiveness and powers of generalization (transfer) and integration' (Crabtree, 1966, p. 524). One demonstrates his mental image of something through communication system - speech, writing, painting, carving, drawing and the like. Due to distorting effects of the symbols and labels we use to communicate our thoughts and ideas, any funded structure should at least suffer from distortions. So, there is no structure which is perfect. The hierarchy and the concepts and big ideas which constitute that hierarchy depend on the individual's perception of phenomena.

If geography is about the world of man, it must consist of man's conventional wisdom. We tend to reject unfunded learnings simply because we believe that only funded knowledge constitutes contents for teaching and learning. But funding is not the criterion for establishing what geography should or should not be. Funding is a mere way of storing and communicating information. In Swahili literature we believe that part of it is unfunded. Some nation-states practice "unwritten" constitutions. It would be unrealistic to reject unwritten literature and constitutions simply because they are unfunded. The same applies to geography. Geography is a way of telescoping the real world, the real earth-space; books and journals are not themselves geography, but they fund some aspects of geography which are found in the real environment.

Funded geography can only be called geography if it still reflects the reality in the real environment to which even conventional wisdom belongs and has a spatial dimension.

So long as unfunded contents of the cultural ecology can be conceptualized, internalized and communicated in non-funded form, non-disciplined knowledge, skills, attitudes and values must have structures. These structures may be referred to as "non-disciplined structures" or structures of conventional wisdom. Funded structures of geography of any other phenomenon should be treated as conceptual guides rather than absolute truth. Like taxonomies of educational objectives, structures of geography overlap and are not mutually exclusive. In selecting significant content several structures must be employed and it is not impossible for programmers to design their own conceptual framework of geography.

Significance means that fundamentals within a topic or problem area in question should be located - the key concepts, principles and ideas which have wide as well as powerful applicability to a wide range of problems. For instance, the concept of "globalism" - that the earth is an oblate spheroid, revolving around the sun and on its own axis - is much more powerful, more inclusive than the concepts of latitude, longitude, time zone and season. A program which is crowded with these concepts and ignores the main ones is likely to lack significance. Larger concepts, when selected, can then be used to sample smaller concepts which they subsume.

Besides being a criterion for selecting instructional content the concept of structure is itself an instructional objective. Terms such as synthesis, organization, concept development, and concept learning used in taxonomies and vast literature on how to teach and learn concepts suggest including in an educational program structure as content; it is an important process objective.

6. Balance of Breadth and Depth

In the selection of instructional content care should be taken to ensure balance between breadth and depth. Breadth implies horizontal coverage or as Gardner and Rogers term it "ground-covering". Depth implies vertical coverage, that is, each item of the content is studied in detail. Gardner and Rogers point out that although fundamental agreement exists among educators that depth is preferable to breadth, as yet, however no precise definition for depth exists. 'Too often in practice, it means either the wholesale amputation of content from a course without regard to significance or the wholesale addition of data of minor importance or both' (p. 56). The results of such assumed "depth" course are usually to teach the student longer lists of places, names and dates; the depth course is thus perceived in terms of the quantity of data to be learned.

Too wide a coverage has the danger of superficiality. Too much depth has the danger of not only sacrificing scope but also of divorcing the study from life. To achieve balance, three criteria should at least be considered: first, instructional content has to be significant. Instructional content considered of most importance must be given priority and the content of lesser importance should be slightened or ignored. To ensure significance, a sufficient range of ideas should be chosen which have the greatest applicability or the greatest power to transfer. Second, sufficient time must be alloted for a thorough treatment of important instructional content. Third, much more time should be spent on process and affective learning than has been the case.

VI. SELECTION CRITERIA UNDER MICRO-CATEGORY

This category attempts to identify some criteria that are suggested by the nature of the individual learner rather than the overall characteristics of the society and the nature of the discipline.

The process of trying to teach each student in a way that is best for him, that is, when trying to match instructional objectives, instrumental content and activities to his needs, interests and capabilities, has been termed "personalized instruction" or "humanizing instruction" (Charles, 1972, p. 78; Neal, 1971, p. 1). Education for self-reliance focuses on the nature of the individual learner when President Nyerere (1968) states that education should encourage the development in each citizen of an enquiring mind, an ability to learn from others, an ability to reject and adapt innovations to his own needs, and a basic confidence in his own position.

Some criteria for selecting humanizing instructional content might include student's needs and interests, student's prerequisite capabilities, transferability of learnings, and utility of content to the individual.

1. Needs and Interests of the Learner

Needs and interests of the learner can be psychological and social in nature and both relate to motivation. Abraham Maslow (1954) developed what he called a "hierarchy of needs" in which he considers that basic human needs may be grouped in certain categories as follows:

5. SELF-ACTUALIZATION: freedom to act, to self-express, to satisfy curiosity, to achieve, succeed and produce, to become self-reliant.
4. ESTEEM: feeling of worth from self and others.
3. LOVE: affection and acceptance from parents, friends and others, sense of worth and belonging; brotherhood.
2. SAFETY: freedom from traumatic threat.
1. PHYSIOLOGICAL: basic physical needs such as food, shelter, drink and air.

Maslow argues that besides psychological needs, there are those which are social or interpersonal in nature. For example, the needs he termed love and esteem could be met only through feedback received from other people. Needs such as self-actualization and the desire to know and understand are interpersonal. Maslow believed that the desire to satisfy those higher needs was the motivation that initiated, maintained and guided much of man's purposeful activity.

Maslow makes an important stipulation that each successively "higher" need becomes important only when the needs that are lower on the scale have been at least partially met. Until the needs in one category are basically satisfied, the individual is rarely able to move on to deal with those experiences aimed at satisfying a need in a higher category. For example, the need for safety is not manifested as strongly when one is starving. Self-confidence can occur only if the physiological, safety, love and esteem needs are met to some degree. Further, teachers may expect trouble when students' needs are not met, for they will seek ways to meet them in any way they can.

Although education for self-reliance is not an inventory or a taxonomy of basic human needs, it surely calls for an educational system which should aim at providing the means to satisfy these needs. Maslow's hierarchy serves as one guide to systematic identification of student needs. Programmers, particularly teachers, should identify all basic needs and use them for selecting instructional content and other program components directed toward satisfying human needs. Humanizing learning means to provide the opportunities which can enable each learner to gradually unfold the answers to such questions for himself: Who am I? What can I do? and Where am I going? (Neal, 1971, p. 5).

Besides calling "needs" source, Tyler (1950) unlike Maslow, tends to view all of them as physiological needs. This is what Kliebard (1975) seems to be questioning by stating that 'When tied to the biological concept of homeostasis, the term "needs" seems to have a clear-cut meaning. Hunger, for example, may be conveniently translated into a need for food when one has in mind a physiological state of equilibrium' (p. 74). In fact, Maslow has not been alone in rejecting the idea of psychological deprivation as the prime basis of human motivation. Combs and Snygg (Charles, 1972) thought that human behaviour could be attributed to one sole need - a need for adequacy. They believed that everyone constantly tries to make himself more adequate to cope with life. Robert White (Charles, 1972) postulated one basic human need that he called the "competence need". He thought of it as a need to deal with one's environment, and in it he included such factors as activity, curiosity, explanation, and manipulation. Certainly, students have "higher-order" needs. They need to know about and find out the truth; they need freedom of thought and action to solve problems; they need love, cooperation, and a host of other things which must be provided in order for them to be humans. It is, however, difficult to see how needs can become source of content, but not how they could become selection criteria. But as Kliebard (1975) points out, while it would not be impossible to identify one's needs, it is in fact pointless to objectify human needs in terms of quantitative norms. Of course Tyler's rationale also bases on measurement movement in education and on top-down mode of program development.

At classroom level at which the teacher is constantly selecting the detailed content of the "living program" he should allow the details to vary according to the needs and interests of individuals or groups, possibly through allowing them to participate in instruction. More will be said about student involvement in program development and instruction.

2. Prerequisite Capabilities

Despite the dictum attributed to Jerome Bruner that any subject can be taught to any child at any age of development if appropriate instruction is provided, we must recognize that for effective learning, the abilities of students must be taken into account at any form level and at every point of the selection of instructional content. In selecting the content, the program developer should ask himself whether the learnings can, in fact, be absorbed by the learners.

To cater for student's ability levels, his prerequisite capabilities for learning a new task must be assessed before instruction. The term "prerequisite capabilities" is a new conception of "readiness" and "background of experiences". Ausubel (1959) conceives readiness as the adequacy of student's existing capacity in relation to some instructional objective. Ausubel (1968) suggests that learning occurs when an individual incorporates new learnings into cognitive structure. Incorporability of new learnings into his existing structure depends, among other things, upon the existence of appropriate "subsumers" within the cognitive structure. Thus defined, readiness may be equated with prerequisite capabilities.

Readiness, however, is frequently confused or associated with maturation. Maturation refers to biological growth which occurs largely under the influence of heredity. In maturation, certain structural changes must occur before a certain behaviour or act can appear. Readiness is a product of both training (or learning) and maturation (DeCecco and Crawford, 1974, p. 51). When readiness is conceived in terms of prerequisite capabilities, it means that, in order to learn anything new - a skill, a concept, a principle - one must have existing or prerequisite learning. According to this conception, the degree of readiness for learning equals the completeness of one's prerequisite learnings (Charles, 1972, p. 89).

Similar to prerequisite capabilities is the concept of "entering behaviour" which might as well be referred to as "entering performances". Entering behaviour describes the behaviours the student must have acquired before he can acquire particular new terminal behaviours. Entering behaviour describes the present status of student's knowledge and skills in reference to a future status the teacher wants him to attain (DeCecco and Crawford, 1974, p. 48). However, the use of the term prerequisite capabilities avoids the tendency to conceive student's prior learnings as merely consisting of overt, measurable behaviour.

Thus, one way to make the program content learnable is to select instructional content that fits the learner's prerequisite capabilities (or his "concrete experiences") which should act as subsumers of the new learnings and which should thus provide ideational anchorage. By assessing student's level of ability in a given area, we can decide whether a type of instructional content (and activity) is too easy or too difficult for him. If the content is too easy, the student will be bored. If it is too difficult, he cannot perform; he will become frustrated, will not like the activity, and will hardly wish to continue at it. If pre-assessment is done, a teacher can discover whether the student already has in his repertoire the kind of learnings the teacher wishes to promote. For, students may enter a course with far more competences or capabilities than the teacher anticipates, and time may be wasted while students are taught that which they already know. Conversely, students may know far less than the teacher assumes. In either case, the results of pre-assessment of student's prerequisite learnings may suggest modifications that should be made in the originally selected instructional content. Through pre-assessment, the teacher can identify individuals for whom he may wish to vary either the instructional content or instructional activities or both.

Although it is important to appreciate that the current readiness of students determines the school's current choice of instructional content and other program components, it is equally important to bear in mind that this readiness is partly determined by the appropriateness and efficiency of the previous instructional practices to which they have been exposed (Ausubel, 1959, p. 246).

3. The Concept of Transferability

Relevant education for self-reliance has to prepare the young people for the work they will be called upon to do in the society. In terms of selecting instructional content this means that the content selected should enable the learner to exercise transferability, that is, 'the sort of learning which should enable the student to apply problems solving skills, basic concepts and principles, and attitudes and values to at least the partial answers or questions and the partial solutions of problems which will be of other time and place' (Patton, 1970, p. 3).

For students to be able to become transfer learners the content must be comprehensive and significant. One can hardly become a transfer learner if the program is information-laden. Students have to use information to solve relevant and genuine problems. This requires the program to emphasize process and affective learning. The content should include processes of learning how to learn and attitudes that are most likely to contribute to future learning and effective decision making. The need for transfer learning also calls for retention. Instructional content must reflect learning outcomes that tend to be retained longest - for instance, the processes rather than capes-and-bays information.

4. Utility

Utility refers to the practical usefulness of what is learned to the individual learner. At classroom level, a teacher may choose instructional content for particular groups or individuals according to the usefulness of that content to the desired future careers of the students. This is particularly applicable to vocational training or in situations where optional choices are allowed. Through reading and learning geography the student may, for example, develop a desire for astronomy, economics, resource conservation, cartography and the like. Optional content should be provided to reinforce such interests. Indeed, it is likely that one main motivation most students have for learning one thing on their own is that they know or believe it will be of utility for learning the next thing or that it is related to their preferred future goals and interests.

VII. SOME CRITERIA FOR SELECTING INSTRUMENTAL CONTENT

Although the criteria discussed so far apply to the selection of instrumental content, some characteristics of innovative instructional materials and some problems involved in their selection have to be noted. These might include availability of different forms and types of instructional materials, the provision of the materials for active involvement of the student in the instructional process, student and teacher involvement in the development and selection process, and the provision of the materials for teacher enlightenment.

1. Availability

Jengo (1972) has stressed the importance of "instructional technology" which he finds most teachers tend to treat with awe and suspicion in teaching. Sentenza Kajubi recommends educational technology, including the use of television, as a significant strategy for educational change in developing countries (Adams, Mmari and Vella, 1972, p. 30). While these recommendations cannot be underestimated, the central question seems to concern the types and forms of instructional materials that can be available and used effectively by teachers and students in today's Tanzanian schools to enable instructional technology become easily and cheaply realized through educational process.

Instructional materials used in schools are either imported from foreign markets or produced locally; the former is still a dominant way of availing instrumental content to secondary schools. In connection with the imported materials, the market for finished instructional materials is now enormous indeed. But the influx of these materials on the world market means that hard work is required to locate available relevant materials and to examine them carefully before they can be utilized for instruction. Thus one aspect of the availability problem is simply knowing what types and forms of materials there are from which to select. Another aspect of availability is being able to obtain the material at the time it is needed and with reasonable expenditure of money, effort and time.

Regarding the first availability problem, some data on available and desirable "sight and sound" resources were collected by the Research Division of the National Education Association in 1967 through a sampling survey which included 1,609 teachers from all parts of the U.S.A. Survey results are shown in Table 1 (Gibson, 1969, p. 181). It can be noted that, although many teachers had most of these tools available to them, there was some ambivalence with respect to newer technologies such as computer and closed-circuit television. Although these were most desired, they were not the most available and used resources. There was a tendency for software and small hardware rather than big hardware to be available and used in both elementary and secondary schools.

TABLE 1: Some Data on Types and Forms of Instrumental Content

	Percent of teachers having resources available				*Percent of teachers using resources*				*Instruction resource most desired*		
	All teachers	Elementary	Secondary		All teachers	Elementary	Secondary		All teachers	Elementary	Secondary
Phonograph	92.8%	95.8%	89.4%	Silent filmstrip projector	81.2%	89.0%	72.2%	Educational TV broadcasts	22.9%	21.3%	24.7%
Silent filmstrip projector	92.3	93.1	91.4	Phonograph	79.0	92.8	63.3	Programmed instruction materials	18.4	18.4	18.4
Charts and maps	84.8	88.1	81.1	Charts and maps	77.4	85.0	68.7	Closed circuit television	18.3	13.7	23.6
16mm motion picture projector	84.5	80.3	89.2	16mm motion picture projector	74.3	74.1	74.6	Opaque projector	7.7	9.9	5.1
Overhead projector	83.3	79.3	87.8	Overhead projector	61.5	59.3	64.1	Computer-based teaching terminals	7.3	6.0	8.9
Audio tape recorder	78.4	76.6	80.4	Audio tape recorder	53.8	61.2	45.5	Sound filmstrip projector	7.0	10.2	3.2
Opaque projector	72.8	68.7	77.3	Opaque projector	49.4	54.0	44.2	Overhead projector	5.9	6.5	5.1
Sound filmstrip projector	54.4	45.4	64.5	Sound filmstrip projector	43.9	40.8	47.6	Audio tape recorder	5.6	6.9	4.0
Educational TV broadcasts	36.3	47.8	23.4	Programmed instruction materials	28.6	31.3	25.5	8mm motion picture projector	1.9	1.8	2.1
Programmed instruction materials	34.9	36.3	33.3	Educational TV broadasts	26.1	40.1	10.5	Charts and maps	1.8	1.5	2.3
Commercial TV broadcasts	31.0	33.5	28.1	8mm motion picture projector	16.0	15.4	16.6	16mm motion picture projector	1.5	1.9	1.0
8mm motion picture projector	27.2	21.2	33.9	Commercial TV broadcasts	13.5	16.2	10.4	Phonograph	0.8	0.8	0.8
Closed circuit television	11.1	12.5	9.5	Closed circuit television	7.0	10.2	3.4	Commercial TV broadcasts	0.7	0.8	0.6
Computer-based teaching terminals	3.2	2.6	4.0	Computer-based teaching terminals	1.4	1.0	1.9	Silent filmstrip projector	0.3	0.3	0.2
								Total	100.1%	100.0%	100.0%

The findings of this survey support Gagné's (1974) stipulation that procedures using software and small hardware rather than big hardware, are likely to represent the essence of change in the relationship between learner and instruction. Sometimes these changes arise out of the use of small hardware, sometimes out of large, but there seems to be no direct relation between the size of the hardware and the size of change. For economic and instructional reasons, the use of software and small hardware seems more feasible than turning to big hardware. Even when the need for using big hardware comes, their effectiveness should be evaluated carefully. We should not adopt innovations in our classrooms merely because others have done so. Atlhough big hardware materials have some educational benefits, their introduction must be observed critically and implemented gradually.

Good materials are being designed by projects or individual teachers so that they are multimedia, that is, different types and forms of instructional content are designed to enable the learner to use all or most of his senses in an instructional activity. We thus need to be alert to the possibilities of the multi-sensory approaches to the development of instructional content. Recent instructional materials are designed to support individualized instruction. They lend themselves to student self-use. Such materials would be designed in order to humanize instruction.

The second availability problem - the ability to obtain the instrumental content at the time it is needed and with a reasonable expenditure of time, finance and effort - is a significant problem in our secondary schools. In some instances educators find that the materials which have been selected for their courses are readily available, but that obtaining many others is difficult. For instance, getting the right film at the right time often is not easy. Orders for textbooks, and other materials may delay to respond to teacher requests. And very few schools have learning materials collections and procedures that are adequate to meet teacher's day-to-day needs. Sometimes problems of ordering non-textual materials persuade the teacher that the effort is not worth the trouble.

Both aspects of availability problem could be considerably ameliorated if all school systems would cooperate to initiate and support District, Regional and National educational service centers which, among other functions, could serve as collecting and clearing houses for information about instructional materials and materials themselves and to exchange them among schools. Trained staff of such an educational service center could continuously collect information about different types and forms of materials, samples of materials as they become available to the market or made by individual schools, teachers and students. It could disseminate copies or samples to teachers for evaluation before they are used in schools.

Such educational service centers would ensure easy availability of instructional materials to schools. Teachers would readily and orderly avail to materials instead of after-hour occasional and individual efforts that teachers must make if they are to inform themselves about relevant materials. The limited resources would be pulled together rather than being dissipated. Educational service centers would facilitate the exchange of various views, materials and research findings between teachers and their students and others directly and indirectly involved with educational matters; service centers would coordinate individuals and institutions. At school level, teachers in different departments would collaborate to contribute to these centers.

Educational service centers would perform a continuous evaluation of all types and forms of instructional materials as they become available. This evaluation could be based on criteria such as those suggested in this study, or any others developed by the staff in collaboration with other people particularly the classroom teacher. The evaluation of each item could indicate tentative program goals and objectives to which the material would be likely to contribute and the characteristics of learners who might use it effectively. Such evaluation would avoid the tendency for selecting materials from catalogues by merely reading a title of the material and its commercial description and ordering it without adequate knowledge of its content and effectiveness. A model for analyzing instructional materials and classroom transaction similar, for example, to that used by the Curriculum Materials Analysis System (CMAS) (Morriset, Stevens, Woodly, 1968), would help teachers and service center personnel in meeting this challenge.

If educational service centers, staffed with adequate trained personnel, could be developed, they would promote the designing and selection of relevant instructional content and would provide a basis for establishing and supporting a local materials industry. Educational service centers would in so doing act as one efficient change agent.

2. Active Student Involvement in the Instructional Process

Instructional materials must provide the opportunity for activity student involvement in the teaching and learning process. If students have to develop inquiring minds, the materials must be inquiry-based. And if instructional content does not provide for active student involvement the chances are that this important component of instruction will receive only lip service.

Students must be able to read, meditate or actively act upon the instructional materials, have the facility to meaningfully accommodate the learnings conveyed by these materials to their cognitive structures, associate and transfer prior learnings to various kinds of other experiences, and respond orally or by recording with some evidence of understanding the learnings accorded to them.

One way to make instructional materials inquiry-based, is to build motivators into them so that the materials stimulate student's interests, curiosity and reactions such that they attend to them and find out what they are about. Among these motivators are the characteristic features of the material itself such as, for example, its vididness - size, colour, and movement (Seagoe, 1970, pp. 129-120). A common and more efficient motivator is a question. For instrumental content to be really inquiry-based, it must employ a question as a major means of forcing a learner to act upon data and, hence, get involved in problem solving. It is the content which encourages the students to work out answers for themselves which should become much more prominent than has been the case. Such content will promote thinking, research and debate. Materials employing a question might be used in activities that permit discovery, simulation, gaming and role-playing and other experiences that can enable the learners to use their senses and mental processes.

Certainly, there will always be a place for instructional materials to deal with learnings in an expository fashion, but its dominance in instruction will be much more eradicated if we develop materials that can challenge student intellect and involvement. Programmers should find ways of compensating for expository emphasis in instructional materials. In particular, teachers and their students must select and develop the facility to use such content effectively. Inquiry-based materials are the ones most likely to achieve our intents of helping the learners to develop inquiring minds, to solve problems and to make decisions and, therefore, to become self-reliant individuals rather than robots.

3. Student and Teacher Involvement in the Development and Selection of Instructional Content

Most instructional materials used in secondary schools are prepared by people who have had no direct association with the classrooms in which they are used. Authors of imported instructional content often design it for specific school systems in their countries and the purposes for this content may be quite different from ours. A degree of discrepancy exists between the materials actually used and those suggested by the philosophy of education for self-reliance and the nature of the learner. In order to close this gap, teachers and students must be involved in the development and selection of instructional materials.

Through being involved in this task, teachers and students will acquire the skills, knowledges and processes for designing, analyzing and selecting relevant instructional materials. Armed with these pay-offs, they will be able to profitably cooperate with other material designers.

Although the idea of student preparation of materials may sound "far out" to many, it is not as academically outrageous as it may seem. The textbook may well be a hostile artifact of schooling to many students. If it is shoved at the learner, especially who is prepared to reject any preprocessed educational tools, it becomes a hated object, particularly if it is old, tattered and dull. If, however, a student is required to "write his own book" he will be encouraged to take an active role in the teaching and learning process. Students might develop transparencies, slides, films, taped information, photographs, pictures, maps, models and transect diagrams. Writing scenarios for role-playing situations, simulations and games, directing videotape presentations and supervising the organization of group discussions with appropriate written and audio materials are also activities that creative teachers can encourage students to carry out. Through practical and field geography various forms of instrumental content could be collected and/or designed. Statistical data can be transformed into graphs, diagrams, tables and written accounts. Simple weather and cartographic equipment and apparatus can be made. From the real environment samples of of rocks, agricultural and industrial products, fossils and relics and original documents can be collected and analyzed.

For teachers and students alike, the fundamental point is involvement within and outside the school gates. Teachers and students must be able to constructively transform the real environment into the decision environment. Student and teacher involvement in the development of instrumental content and instructional objectives can encourage both of them to share instructional activity, to learn together, and to want to learn together. Indeed, no school system should rely wholly upon instructional materials which have been presented to it by remote authors, regardless of their brilliance and intellectual virtue of such resources. All educational institutions should provide a genuine role for teacher and learner to "mine their heads" and inject their ideas, initiative and intelligence into whatever desired outcomes and materials used for education for self-reliance.

4. Teacher Enlightenment

Despite the discrepancy which exists between the imported materials and those actually demanded by education for self-reliance, imported materials can be of tremendous advantage if wisely selected and used properly. What is risky is a wholesale selection and adoption of such materials in schools. One important pay-off from materials developed outside Tanzania or by non-educational organizations would be teacher enlightenment acrued from analyzing packages or kits and similar materials and finding out the possibilities for adapting them to the situations of their schools. Teachers and other program developers would learn much more about program development process by critically analyzing these packages than by merely reading a book about the process.

It has been observed in a number of projects that teachers usually get enlightened by studying new content packages designed for classroom use. Through analyzing, evaluating and adapting the innovative materials teachers often develop new methodological skills and learn by doing. Project and/or teacher developed materials are designed such that they are multimedia. They are printed, visual, and audio. They include cassette tapes, filmstrips, overhead transparences, 8mm. single-concept motion-picture films, microfiche cards, records, recording and playing devices, games, simulations, artifacts and books. The packages include "software" and small "hardware". Required for efficient use of such materials is an extensive array of equipment such as cassette tape recorder, overhead projector, motion-picture projector, record player, typewriter, microfilm reader and other small and big machines (Foxm 1972, pp. 138-39).

In geographic education, for example, the High School Geography Project (Krug and Gillies III, 1970; Patton, 1970; HSGP, 1970) has developed such instrumental content which is of manipulative nature. Its materials exist in three categories. The first category relates to the Teacher's Guide for each of the six units which outlines a quantity of data significant to the teacher. A unit introduction, unit objectives, unit evaluation, materials inventory and suggestions for advance planning constitute the initial segment of the teacher manual or guide.

Basically, the Teacher's Guide attempts to present possible student activities and teacher's methods by which student inquiry can be encouraged.

The second category deals with student resources. For each of the six units exists a Student Resource book which constitutes basic reference literature and statistical data. There are also student exercise manuals which require writing. Each unit also contains various types of indexed, packaged separates which include statistical data important to interpreting of an inductive, inquiring basis. Optional materials are included.

The third category of instrumental content of the HSGP pertains to basic audio-visual small hardware and models. For example, such manipulative devices as role cards for simulation activities, transparencies, phono-discs, filmstrips, stereograms and plastic modulex map boards are variously dispersed throughout the entire six units.

Aoki (1970) warns that packages have the danger of deprofessionalizing the teacher. 'The packages in one sense deprofessionalize a teacher if she is to be merely a technician putting into operation a product of a curriculum engineer' (p. 5). Indeed, packages can make teachers passive receptacles, receivers and users of specialist products if the school authority and producers find tricks to dictate and make teachers do so rather than act as innovators, designers and adaptors. But if teachers are given an opportunity to use these materials so that they acquire an ability to learn from what others do, and reject or adapt them to their own needs and the needs of the students, these materials can perform an inservice teacher education function which may well not come about in any other way. To say so is not to accept the idea of schools teaching finished and fixed, purchasable programs.

VIII. THE TEXTBOOK AND BOOK LEARNING

Should the textbook be discarded because it has tended to encourage book learning? The textbook has been over-used mainly because it is relatively easy to order and to use in the classroom and generally serves as a wide-range foundation for the subject matter in a course of study. There are few objections to the continued use of the textbook as such, but many people do raise important questions about the content of the book, about how this content can be used with or without the textbook.

Studies along these lines 'found that most textbooks lacked diversity in dealing with social issues, avoided controversial subject matter, and were generally didactic in presentation of facts and data' (Gibson, 1967, p. 177). A textbook is criticized for preaching to the students. It does not tend to support the inductive approach to teaching or to provide springboards for student discovery or contemplative inquiry. It must be admitted that such an approach is difficult to provide if the teacher preaches as well. However, given the strong thrust toward involving the student in the transactional activity and the need for learners to develop inquiring minds, the textbook must make some concessions along these lines. Instructional textbooks, particularly those intended for younger and slower students should break away from purely didactic approach to a balanced mixture of inquiry approaches.

Good textbooks include bibliographical sections, suggest additional readings and accompanying equipment. Too often these listings are ignored by teachers and students alike. But if given attention, these listings form a foundation upon which students and teachers could explore more information and could be helped to improve skills in locating the sources.

All teachers in a school should collaborate to teach students the proper use of a textbook and other sources of information. Usually this task is left to the language teachers alone. Such individualistic tendencies will not help much to establish a cooperative climate in which the totality of educational process is directed towards student learning. The responsibility of helping students to acquire library skills and abilities to use a textbook effectively should not only be shouldered by language teachers. Every teacher is a language teacher so long as he aims at enabling students to grasp a particular "register" used in his field. Along with our language teachers we must all cooperate to promote students' linguistic abilities.

Another problem concerns the practices of purchasing textbooks. The usual practice is to buy as many copies of a single textbook as students, sometimes even more. As such the limited finance is invested in one type of a textbook. Consequently, not enough variety of sources is provided. Such a narrow choice of textbooks induces reluctance of teachers and students to build up and use the school library. Rather than purchasing a copy of a textbook for each student, few copies on a wide variety of themes and problems should be made available to the school library. Certainly, there will always be some very basic textbooks which each student should have in a single activity. But such textbooks must be selected wisely.

Properly used, a textbook, like other types of printed forms of display, can promote rather than hinder student learning. It can do so providing that its content reflects many approaches instead of one to the subject being studied or to the problem being investigated, that it facilitates student engagement, that it suggests materials by other authors which give various viewpoints about the topics being studied, that its content is valid for the problems being tackled, and that it is treated as one among the numerous types of instrumental content and the sources of learnings.

In this chapter, an attempt has been made to indicate that one major way of avoiding alienation of our learners from the needs and problems of their society and of personilizing teaching and learning is the careful selection of the instructional content. Despite the growing advocacy for the use of objectives stated in terms of overt, measurable behaviours of the learners, much controversy surrounds them and this needs scrutiny before we preach the use of these objectives.

The above list of selection criteria should be treated as illustrative rather than sacrosanct. Teachers and students must be able to identify such criteria, evaluate them, and be able to use them according to the realities of our society.

Exclusive reliance on imported instructional materials must be abandoned in favour of an attempt to create such materials by using our cultural ecology. The imported materials, however, must be selected wisely. The use of the service centers suggested above is most likely to lead to the choice of most relevant and genuinely needed forms and types of instrumental content. In order to achieve our educational aims, inquiry-based materials should be more used and encouraged than has been the case.

CHAPTER IV

THE ORGANIZATION OF INSTRUCTIONAL CONTENT

Program development and instruction involve the process of organizing the selected instructional content into an instructional "sequence". We need to continuously ask: How might instructional content of a program for geographic education for secondary schools be organized so that students achieve the selected learning objectives?

This chapter aims at investigating and establishing some criteria that may illustrate the process of organizing instructional content. This theme could be approached by discussing the organization of instructional objectives and instrumental content separately. However, the elements of an instructional objective, be it specific or general, suggest that the organization of educational objectives directs the organization of instrumental content. The most specific objective includes, among its components, the subject-matter and/or instrumental content. Even at its non-specific level, an educational objective includes 'the subject-matter and what to be done with the subject matter by the student' (Krathwohl, 1964, p. 20). This holds even in the case of "unintended" objectives or when objectives are specified by the students themselves.

In process learning, the subject-matter is itself conceived as a form of instrumental content to be acted upon by the learner. Therefore, organizing the instructional objectives automatically involves organizing the instrumental content. If, for example, the student has to perform chain surveying before prismatic compass surveying, a chain is used before a prismatic compass is employed. If the student should be able to produce a plan by using both types of surveying, both forms of instrumental content are used at the same time. Thus, the type of instructional objective and instrumental content selected and the type of activity to be performed to achieve that objective are highly interrelated. The criteria used to organize the instructional objectives also apply to the organization of instrumental content.

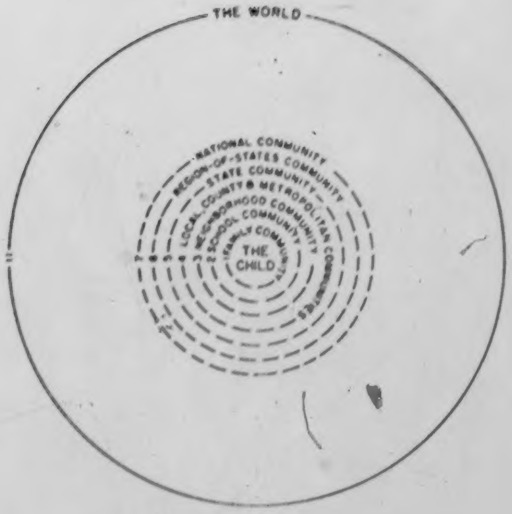
This relationship is important because it partly explains the arbitrariness of treating the educational "ends" and "means" as separates. A statement of the end, the intent, is also a statement of the means and thus becomes an "end-means" statement. This is another way of conceiving 'the interactional character between ends and means' (Aoki, 1974, p. 92). This interaction also suggests the significance of deciding about instrumental content at the same time the objectives are being selected and organized rather than treating them separately or uni-linearly.

I. THE ORGANIZATIONAL CRITERIA

1. Scale

Among the traditional criteria for organizing geographic content for instruction is the concept of scale (Kohn, 1966, p. 414). According to this criterion, content is organized such that instruction begins with content dealing with the small and most immediate area or locality in which students live and then proceeds to larger and more remote localities at District, Regional, National and Continental or World levels. As instruction proceeds over time, students cover larger and larger areas than their own locality. This way of organizing content from the local area to the wider world is sometimes known as "concentric" approach to the establishment of scope and sequence of an instructional program. Hanna's (1963; 1966) model of "Expanding Communities of Men" (Figure 18) uses the notion of scale or concentric approach to content organization.

The concentric curriculum has traditionally been based on the notion of student's background of experiences by which readiness is equated with maturation. The scale of an area to be covered is determined by the students' maturation rather than their prerequisite capabilities. The younger the student the more immediate are the places covered and vice versa. Thus as the student matures, he moves from "known to unknown" or from "experientially familiar to experientially different places".


THE WORLD
NATIONAL COMMUNITY
REGION-OF-STATES COMMUNITY
STATE COMMUNITY
LOCAL COUNTY & METROPOLITAN COMMUNITIES
NEIGHBORHOOD COMMUNITY
SCHOOL COMMUNITY
FAMILY COMMUNITY
THE CHILD
1
2
3
4
5
6
7
11

Emphasis No. 1 — The Family Community
Emphasis No. 2 — The School Community
Emphasis No. 3 — The Neighborhood Community
Emphasis No. 4 — The Local Communities: County, City, and Metropolis
Emphasis No. 5 — The State Community
Emphasis No. 6 — The Region-of-States Community
Emphasis No. 7 — The United States National Community

FIGURE 18: Sequence Coordinates: Expanding Communities of Men (Hanna, 1963, p. 139; 1966, p. 79).

Student's experience is associated with his physical age and the scale of the area to be covered. Another assumption underlying this approach is the holistic view that students will learn better if instructional content is organized and presented in wholes. Our geography syllabi for Primary and Secondary schools are basically organized according to Hanna's concentric curriculum.

Although concentric organization of instructional content may have educational value, it has in our case encouraged the traditional conception of a geographic region. Geographically, the spatial whole is a region. According to Hanna's model, the scale of an area increases as instruction proceeds outward from the center of the circle. At secondary school level traditional Regional Geography has meant the organization and coverage of large areas, the smallest scale being a nation-state. Then countries and continents are covered according to the fixed 'formula of relief, structure, climate and vegetation, followed by agriculture, industry, settlement, routes and the like' (Long and Roberson, 1966, p. 18). Hanna's formula is depicted in Figure 20.

Besides encouraging a wholesale coverage of places and facts, this organization encourages unnecessary and time consuming duplication of content. In studying East Africa, for example, students have to repeat at least nine headings for each country (Appendix I). Forms 5 and 6 students have to cover all countries of Africa South of Sahara, Western Europe and North America each of which has to include physical and human geography and has to be treated under the same formula as illustrated in Figure 19. Consequently, numerous countries are covered in discrete manner and the same questions are repeated about each. This traditional approach obviously overburdens students with details which are not systematized by major problems, concepts and ideas. Students tend to be confused by the multitude of details and/or forget them.

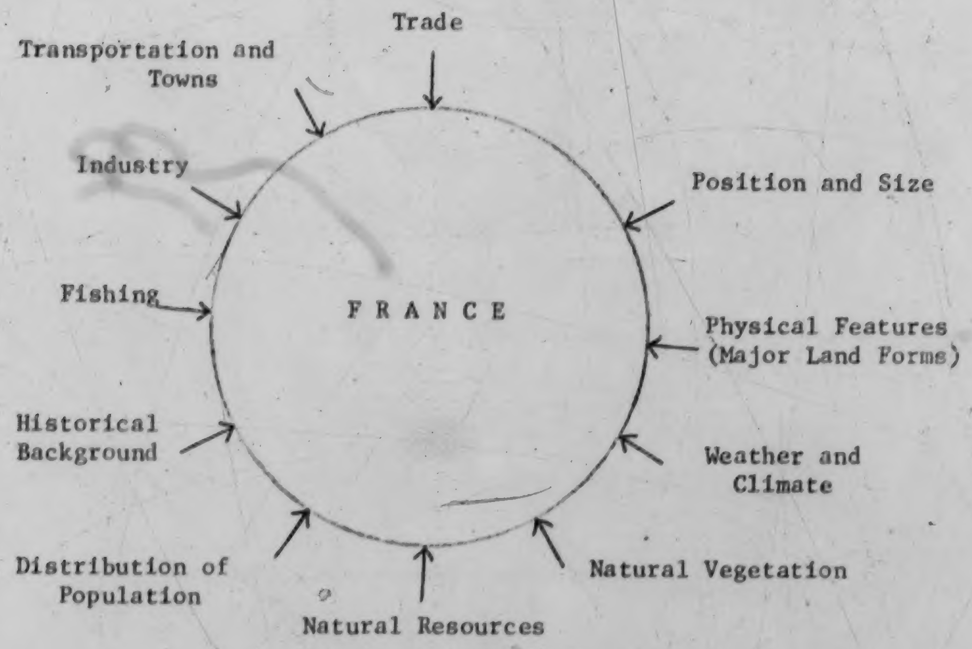

Trade
Transportation and Towns
Industry
Fishing
FRANCE
Position and Size
Physical Features (Major Land Forms)
Historical Background
Weather and Climate
Distribution of Population
Natural Resources
Natural Vegetation

FIGURE 19: Traditional Formula of Regional Geography (After Taba, Durkin, Fraenkel, McNaughton, 1971, p. 33).

The urge to pass terminal examinations drives students to cram unrelated masses of information. Under such circumstances much of geography taught is likely to be studied for the sake of studying it rather than for education for self-reliance.

As the 1947 and 1955 syllabi indicate, this weakness of organizing content country by country and continent by continent is indeed one heritage from the past syllabus development practices. The tradition still prevails in the 1973 syllabus and has certainly tended to alienate our young people from relevant content and problems.

We need to organize instructional content in accordance with the conception of a region as proposed earlier. A region should be conceived as an area of any size differentiated from another by announced criterion or criteria. It has been shown that this conception of geographic region enables one to define geography in terms of patterns and processes and to grasp the fact that all geography is regional and that geography is not divided between regional and systematic geography. Defining a geographic region in terms of known and intended criteria would also tend to eliminate focusing on broad "cultural regions" and also the broad application of climatic and other physical and biotic zones as key study frameworks.

When the criterion of scale is used, it is normally associated with political boundaries within and between nation-states. However, political boundaries impose arbitrary divisions on some spatial phenomena which form other geographic regions. Of course, political boundaries would serve as a criterion if the focus were on political areas and problems. But since we are interested in regions other than political regions, other criteria must be employed to define these regions. The scales of various regions will vary in accordance with the types of criteria used; that is, the extent of the study area will depend on the selected criteria or criterion for establishing its size.

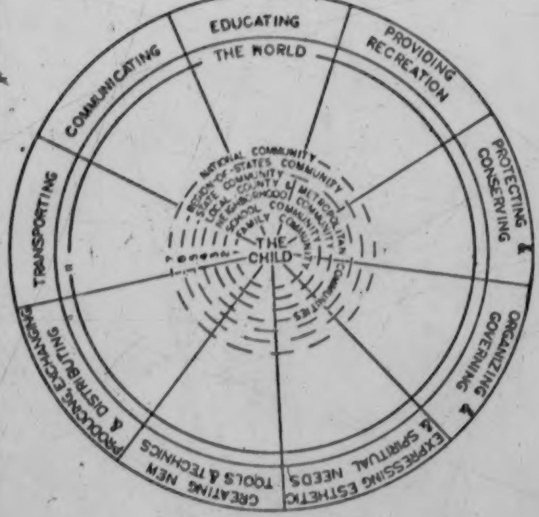
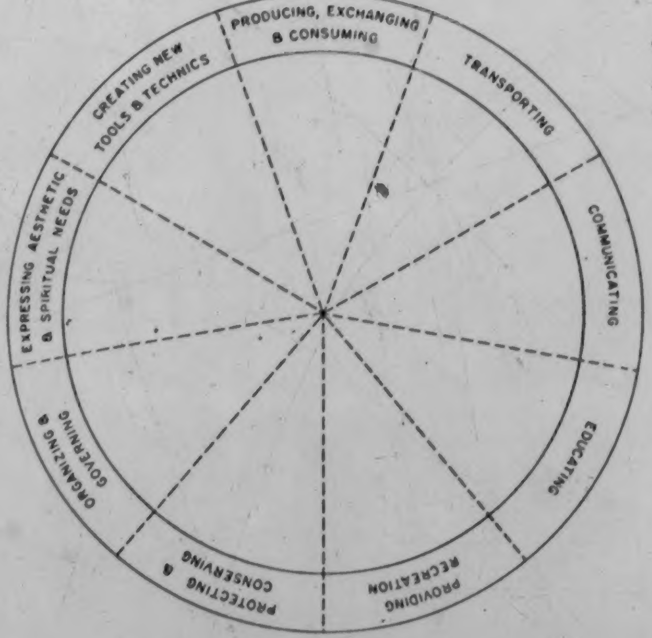

EDUCATING
THE WORLD
PROVIDING RECREATION
PROTECTING CONSERVING
ORGANIZING GOVERNING
EXPRESSING ESTHETIC & SPIRITUAL NEEDS
CREATING NEW TOOLS & TECHNICS
PRODUCING EXCHANGING & DISTRIBUTING
TRANSPORTING
COMMUNICATING
NATIONAL COMMUNITY
REGION-OF-STATES COMMUNITY
STATE COMMUNITY
LOCAL COUNTY & METROPOLITAN COMMUNITIES
NEIGHBORHOOD COMMUNITY
SCHOOL COMMUNITY
FAMILY COMMUNITY
THE CHILD

FIGURE 20(a): Categories of Basic Human Activities Overlaid on Expanding Communities (Hanna, 1963, p. 193).


PRODUCING, EXCHANGING & CONSUMING
TRANSPORTING
COMMUNICATING
EDUCATING
PROVIDING RECREATION
PROTECTING & CONSERVING
ORGANIZING & GOVERNING
EXPRESSING AESTHETIC & SPIRITUAL NEEDS
CREATING NEW TOOLS & TECHNICS

Producing, Exchanging, Distributing, and Consuming Goods and Services
Transporting People, Goods, and Services
Communicating Information, Ideals, and Feelings
Providing Education
Providing Recreation
Protecting and Conserving Life, Health, Property, and Resources
Organizing and Governing
Expressing and Satisfying Aesthetic and Spiritual Needs
Creating New Tools, Technics, and Institutions

FIGURE 20(b): Scope Coordinates: The Wheel of Basic Human Activities (Hanna, Sabaroff, Davies and Farrar, 1966, p. 83).

For instance, when differentiating among areas, two operational procedures are possible: (1) mapping location sets comprising like members, and (2) mapping location sets comprising unlike members joined by a complementary spatial process or arrangement (pattern) (Picker, 1965). Groupings of identical locations (persons, places, and things) are then collated and applied to the map. The resultant spatial patterns have regional connotations. Take, for example, the topic of population. Ethnographically, regions covering cultural behaviour, such as language and religion, exist as spatial patterns; demographically, so do those involving fertility rates, mortality rates, sex ratios, and population densities. The same holds for economic and political activities. Specific crops, types of manufacturing, voting trends, administrative responsibility and movement (transfers, for example) can all be demarcated regionally. Equally numerous are the regions drawn from the natural phenomena: soils, slopes, temperature, rainfall and vegetation, catchment, to name a few.

Geographic regions defined in terms of announced criteria are not opposed to systematic approach. Both use the topical approach because the defining criteria are topical and both use regional concept to identify the areas of homogeneity (Broek, 1966, p. 73). Therefore, a geographic region centered on announced criteria leads to a better understanding of supposed dualism between systematic and regional studies.

In order to avoid "coverage geography" the criteria for defining geographic regions should center upon relevant problems, that is, the defining criteria must be determined by the need to investigate genuine problems. Suppose students have to investigate demographic problems in Tanzania and to relate them to situations in other countries. For students to achieve the global awareness of these problems without merely experiencing country-by-country coverage of the earth, demography as a topic involving a spatial dimension, concepts and principles of problem solving and decision making, can be treated by being illustrated in terms of whatever parts of the earth are relevant to the problems being investigated (Figure 21). Conceptual schemes such as the

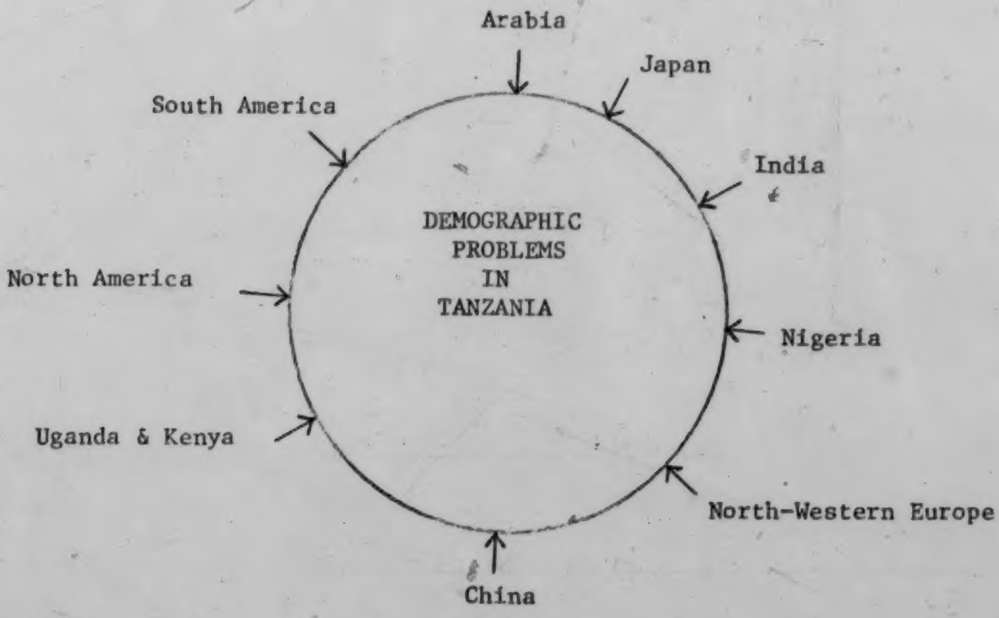

Arabia
Japan
South America
India
DEMOGRAPHIC PROBLEMS IN TANZANIA
North America
Nigeria
Uganda & Kenya
North-Western Europe
China

FIGURE 21: Problem-Oriented Organization of Instructional Content After Taba- Durkin- Fraenkel- McNaughton, 1971, p. 33.

7

Demographic Transition Model and the "Push-Pull" migration model can be employed to analyze and synthesize students' findings from different countries.

According to this approach various aspects of demographic problems in selected countries and regions would be examined. It would utilize both regional and topical approaches simultaneously. This organization would afford students an opportunity to compare, to contrast and thus to perceive relationships. The approach would create less pressure for coverage of large amounts of unrelated content, and would permit time to develop significant ideas with which to interpret issues of demography and related problems in whatever country and would avoid unnecessary duplication of content.

For any topic and area studied, the aim would not be to learn all about the selected countries, rather, about important aspects of life which illustrate important characteristics and issues of human activity or action and development.

2. Hierarchical Organization of Instructional Content

Of the educational interests in identifying the "structure of the discipline" is the problem of organizing instructional content and particularly the instructional objectives. This concern assumes that because a discipline has a structure, the disciplined curriculum or program must also have a structure. Johnson (1968) points out this view when he writes: 'That curriculum implies such ordering is obviously the assumption underlying the widespread current attention to the structure of knowledge, especially of that knowledge derived from inquiry which constitutes the disciplines. It is implicit in the analysis by Phenix and explicit in that of Schwab that disciplines are structured both conceptually and syntactically (methodologically)' (p. 45).

The writer's interpretation and beliefs regarding the structure of the discipline have already been explored. Despite the assumed formal structure of geography, it would be misleading to preach that there is one fixed, and absolute structure. Fenton (1966) makes the same point when he states: 'Although each (project) has developed a workable list (of concepts), the lists are not identical. This result suggests that the social studies do not have a single structure inherent in the discipline. Each person brings his own "imposed concepts" to the task of selecting concepts. Hence, each person has his own structure' (p. 3). Even the existing structures of geography overlap, sometimes conflict, and are not absolute. However, the significance of identifying the structures of geography that can be employed as analytical and operational tools for investigating geographical problems and for aiding the selection and organization of instructional content and other program components can not be underestimated.

It has also been established that the structures of geography and themes have a direct relationship with the taxonomies of instructional objectives. The relationship is such that both are based on the principle of a hierarchy of concepts. They both assume the ascending order of concepts. Like structures of disciplines, taxonomies of instructional objectives might be useful conceptual schemes for guiding the selection and organization of instructional content.

In utilizing the hierarchical schemes to organize instructional content it is assumed that content should be organized around the key concepts of a topic (its structure) in question. It is assumed that each of the key concepts forms a hierarchy in the sense that each can be acquired and used on different levels of abstraction, complexity and generality (Taba, Durkin, Fraenkel, McNaughton, 1971, p. 19). Instructional content is then organized such that instruction begins from "specific to general", from "simple to complex" and from "concrete to abstract" learnings.

Helburn (1968) has developed an organizational scheme of instructional objectives (Figure 22) which is based on Bloom's and Krathwohl's Taxonomies of educational objectives.[1] At the

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[1] The writer is not certain of the reason why Helburn entitled this scheme "The Scientific Method - The Geographer's Way". Geography uses many methods including those which others may label "unscientific". Besides, taxonomies are not the geographer's way as such; they are everyone's way.

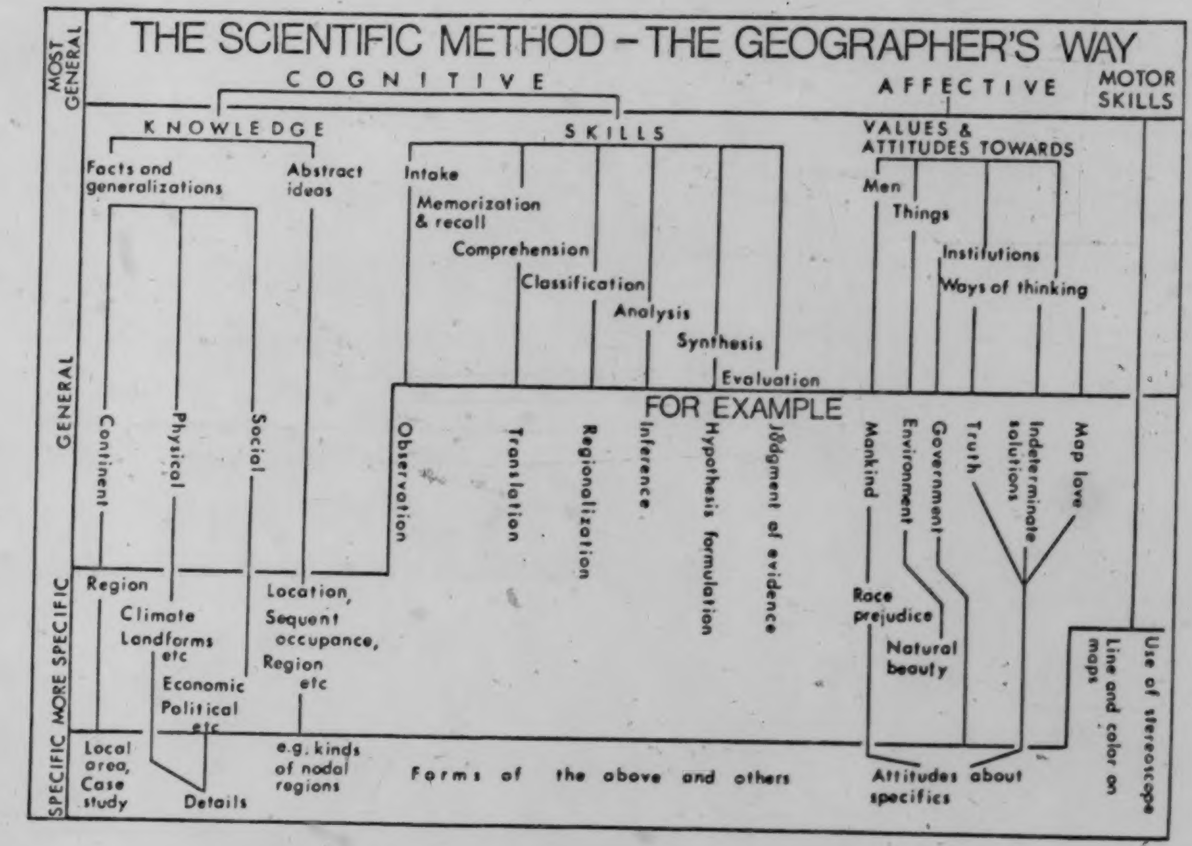

THE SCIENTIFIC METHOD – THE GEOGRAPHER'S WAY
MOST GENERAL
GENERAL
SPECIFIC MORE SPECIFIC
SPECIFIC
COGNITIVE
AFFECTIVE
MOTOR SKILLS
KNOWLEDGE
SKILLS
VALUES & ATTITUDES TOWARDS
Facts and generalizations
Abstract ideas
Intake
Memorization & recall
Comprehension
Classification
Analysis
Synthesis
Evaluation
Men
Things
Institutions
Ways of thinking
FOR EXAMPLE
Continent
Physical
Social
Observation
Translation
Regionalization
Inference
Hypothesis formulation
Jüdgment of evidence
Mankind
Environment
Government
Truth
Indeterminate solutions
Map love
Region
Climate
Landforms etc
Economic
Political etc
Location, Sequent occupance, Region etc
Race prejudice
Natural beauty
Line and color on maps
Use of stereoscope
Local area, Case study
Details
e.g. kinds of nodal regions
Forms of the above and others
Attitudes about specifics

FIGURE 22: Helburn's Classification of Instructional Objectives in Geography (1968, p. 276).

top of the pyramid are the most general statements of objectives which have to be broken down into general, specific and more specific instructional objectives. This scheme was utilized by the High School Geography Project to select and organize the instructional objectives and instrumental content and to guide evaluation (see also Gunn, 1970, p. 43). The project organizes instructional content in all of the six units such that learners move from the simple to the complex. This sequential learning is formulated around the student using cognitive skills on data to develop generalizations illustrating abstract ideas. Students are required to use some of the lower-order intellectual skills such as comprehension and classification, one or more of the complex levels of intellectual skills such as analysis, synthesis, judgement and evaluation (Patton, 1970).

Gagné (1964;, 1965(a); 1965(b); 1967) has likewise developed a hierarchical scheme of the classes of behaviours which range from simple to complex. Gagné (1967) suggests that complex cognitive behaviours are invariably composed of simpler tasks, and that attainment of these tasks is necessary before the complex behaviours can be demonstrated. Gagné stipulates that for learning any given task a hierarchical structure exists. The structure includes critical subtasks that a learner masters during instruction. For instruction to be successful, these subtasks must be identified for any instructional objective. Gagné does not confine structure to a discipline, but conceives it as existing for any given learning task.

Significant limitations of the taxonomies can further be ascertained by comparing Bloom's Taxonomy with Gagné's Scheme.

Bloom's knowledge category encompasses at least three of Gagné's lower categories; thus classifications as minute or exact as in Gagné's Scheme are not necessary when using the cognitive taxonomy to guide one's organization of content (Popham and Baker, 1970, pp. 67-68). However, if we apply the assumption of objectives stated in overt, measurable behaviours of students that the test of any system for classifying behaviour is its usefulness for task analysis, which, in turn, should enable the teachers to distinguish various performances and to establish the necessary learning conditions for achieving these performances, we find that Gagné's classes of behaviour are more useful for this purpose than those of Bloom and his associates. This is because the educational objectives listed in Bloom's Taxonomy do not meet the requirements for detailed task descriptions (a full description of terminal performances), for they lack a careful description of the conditions under which the desired performance must occur. For example, the Taxonomy lists as an objective "the ability to propose ways of testing hypotheses" (DeCecco and Crawford, 1974, p. 42).

Another limitation of Bloom's Taxonomy is that each of the formal characteristics listed does not clearly fall into one distinct class. Gagné (1964; 1965(b), p. 40), for example, asks how "knowledge of generalization" is distinguished from "interpretation" (which falls under the class comprehension) and how both are distinguished from "comprehending the interrelationships of ideas" (which comes under analysis). 'Some of the members of these categories are distinct from each other only in terms of their specific content, rather than in terms of formal characteristics which affect their conditions of learning. "Knowledge of terminology" for example, is difficult to distinguish from "knowledge of classifications and categories'; likewise "knowledge of generalizations" does not appear to be very different from "comprehension" and neither of these from "comprehending the interrelationships of ideas"' (Gagné, 1964, p. 38). Here is another indication that taxonomies of educational objectives are not mutually exclusive.

For purposes of utilizing instructional objectives stated in terms of student's overt behaviours, Gagné's classes of behaviour provide for both explicit statements of instructional objectives and for relatively distinct behaviour categories. Because his behaviour classes are themselves products for research on conditions of learning, they might have particular usefulness for categorizing and organizing instructional content.

Popham and Baker (1970, pp. 68-72) suggest another approach to performing of task-component analysis using operational objectives. Here, the programmer first inspects the list of operational objectives to determine those that seem the most difficult in terms of the student responses called for.

Such objectives would most likely be placed in the upper levels of taxonomical classifications. Then an inspection of these "high-level" objectives is done to see what necessary subskills are included in them. The actual order of instruction is not so critical so long as all subtasks have been taught.

One way to tackle task-component analysis is to look at each specific objective in terms of the following question: "What does the learner need to be able to do before he can perform this task?" This means that students' prerequisite tasks or learnings must be identified before instruction begins. Using these prerequisite learnings subsequent revisions in planning can improve the original analysis.

Popham and Baker have developed a scheme (Figure 23) for a course of action when there is no clear order implied, that is, in a situation the programmer is faced with multiple paths for a particular objective. In such an instance the programmer may have to consider the question of which path to deal with first in the light of other objectives planned for the class, so that prerequisites taught early and subsequently practiced extensively are those that are most important and most generalizable to other classroom objectives.

In sum, these writers suggest the approach which requires the programmer to (1) analyze objectives into content-behavior modules; (2) use guidance from a regularized scheme, such as that proposed by Gagné or Bloom and Krathwohl; (3) arrive at a first

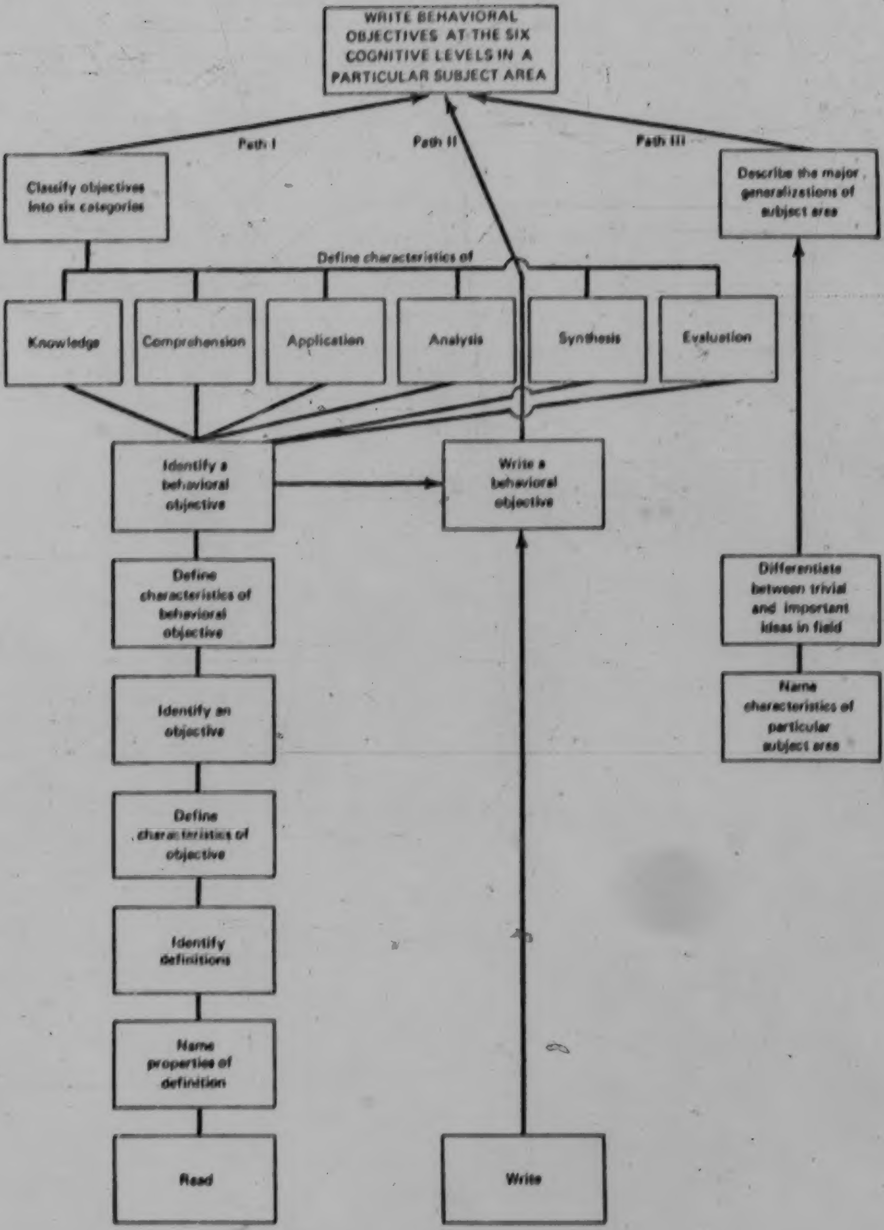

WRITE BEHAVIORAL OBJECTIVES AT THE SIX COGNITIVE LEVELS IN A PARTICULAR SUBJECT AREA
Path I
Path II
Path III
Classify objectives into six categories
Describe the major generalizations of subject area
Define characteristics of
Knowledge
Comprehension
Application
Analysis
Synthesis
Evaluation
Identify a behavioral objective
Write a behavioral objective
Define characteristics of behavioral objective
Differentiate between trivial and important ideas in field
Identify an objective
Name characteristics of particular subject area
Define characteristics of objective
Identify definitions
Name properties of definition
Read
Write

FIGURE 23: Popham and Baker's Approach to Task-Component Analysis (1970, p. 70).

sequence while repeatedly identifying the student's prerequisite learnings; (4) clearly identify prerequisites not within that instructional area; and (5) where possible, empirically verify sequences generated. The empirical measure of an instructional sequence is the experimental comparison of it against all other contending sequences.

It should, however, be noted that Gagné, Popham and Baker are interested in objectives stated in terms of student's overt, measurable behaviours. So-called non-behavioural objectives are as well significant and necessary. The overdosing of a program with overt, measurable objectives is likely to culminate in a teaching-learning process which foregoes the affective and process objectives that do not readily render themselves to public observation and to quantification.

Regularized hierarchical schemes of educational objectives, like structures of discipline, are general conceptual frameworks essentially resulting from the synthesis of studies or considerations of individual learners. They might, therefore, be categorized as macro-schemes guiding the selection and organization of program components.

At individual level, learner's process of concept formation (or structure formation) can guide the organization of instructional content as it does guide the selection process. In this connection, Ausubel (1968, p. 56) makes the distinction between perception and cognition by suggesting that perception involves immediate awareness, or some level of meaningfulness of the sensory stimuli, and cognition refers to such processes as relating the new materials to existing cognitive structure or categories, thus reconciling the resulting new information or meaning with prior experiences.

The differentiation between a concept (cognition) from a percept becomes an objective of a teacher in organizing program content (Woodruff, 1964, p. 84; McCartin, 1970, p. 231). Perception feeds into the brain the immediate sensory record of objects and events; so given perceptions become prerequisite learnings for concept building. Cognition no longer involves a mental image of the object, but rather the way an individual finds to organize and categorize his percepts. There is a hierarchical and interdependent relationship noted in moving from sensation to perception to cognition (Woodruff, 1964, p. 90). Concept learning has thus been defined as some amount of meaning, more or less organized in the mind as a result of sensory perception of external objects or events, and the cognitive interpretation of the perceived data (Woodruff, 1964, p. 84). Instructional content organized on the basis of the interdependent hierarchy of sensations, perceptions and cognitions could facilitate learner's process of concept formation. Organization of content should aid the learner in this process because concepts are individual's fundamental instruments of organizing thought and understanding.

3. Critical Periods and Age Factors

Investigations of optimal ages and critical periods for learning specific behaviours, coupled with educators' concerns to sequence the program content in accord with students' prerequisite capability levels, has led to a number of studies which attempt to ascertain, by observational and laboratory methods, the optimal age at which learners are able to handle different aspects of their environment. Piaget's contributions to the thought processes of children have given impetus to great numbers of these studies (McCartin, 1970; McNaughton, 1966, Almy, 1967).

In general, investigations have been directed to verifying the developmental periods and have thus concentrated on young children and adolescents. A study focusing on how the stage of formal operations relates to secondary school geography teaching and learning does probably not exist. It seems that hardly any research has been done on this stage of intellectual development. It may, however, be assumed that the nature of the present secondary school learner is very much dependent on his childhood socialization at home, at school and in his community. Educators might thus hope to infer the cognitive development of such students from some of the studies about young children and adolescents. But since one's cognitive development is culture-bound, and because most of the existing studies pertain to cultural situations outside that of our learners, inferences from such studies are likely to have limited generalizability to the context of our secondary school students. Of course, some studies might be of general applicability.

The first period of Piaget's stages of child's intellectual development, termed the sensory-motor, covers the first two years. The child acquires sensory inputs and explores his environment by seeing, listening, touching and tasting. He is accumulating notions of space, time, matter, and causality, and develops the notion of permanence of an object. Ages two to six or seven are considered to be years of the preconceptual and intuitive thought. Early percepts and concepts are concrete, unstable and irreversible. Later the child becomes capable of intuitive thought. He still does not appreciate the principle of conservation of space, length of surface and so on. During the third stage, termed concrete operations which fill the years between seven and eleven, the child performs such operations as combining, associating, identifying, and reversing, but thinking remains tied to a concrete level for the most part. Around eleven or twelve, the child becomes increasingly capable of logical thought. During this last stage termed formal operations, the child is ready to begin creating an order that is more formal.

Piaget's theory of child's stages of intellectual development has been used as a guide for selecting and sequencing program content, for designing assessment procedures and test items and for justifying the use of particular teaching and learning activities to particular students or groups of students.

One assumption for basing the selection and organization of instructional content on Piaget's theory of cognitive development centers on the concept of readiness which was observed in previous discussions. It was in the past generally accepted that readiness for learning was closely tied to biological maturation and that certain learnings could not be taught to a learner until he reached a certain stage of maturation. For instance, it was believed that children could not understand concepts of time and chronology until the later childhood years and that instruction in this area had to be delayed until the secondary school years (Fraser, 1968(a), p. 12; 1968(b)). Hanna's model of the expanding communities was used as a framework for scope and sequence of content on the theory that teaching and learning would be effective if very young students studied their immediate environment (the home and the school) and moved out into the neighbourhood, community, state, nation and world as they grew up.

The secondary school geography syllabus, however, still bears evidence that Hanna's model, along with its assumption of "waiting", is the scheme which largely determines the scope and sequence of the countries and subtopics listed in this syllabus. For instance, in practical geography, it is assumed that for Forms 1 - 4 students to encounter practical experiences involving elementary cartography by using a chain, a prismatic compass and a plane table, they have to wait until high school (Forms 5 - 6) years. As a consequence, the many students who do not receive high school geographic education after Form 4 miss such experiences so essential for the rural life they are expected to cope with. At Nguvumali Secondary School, Tanga, the writer tried all these types of surveying to Forms 1 and 2 students and they were able to use these instruments properly and produced excellent plans, improved outdated 1:50,000 map sheets and were able to master and utilize the necessary processes and procedures involved in these experiences.

Another assumption based on maturation of students is provided by "systematic" (topical) approach built into this syllabus. While Forms 1 - 4 syllabus at least tries to employ topical approach to study the Rest of Africa, North America, the Rhine Lands and China, Forms 5 - 6 syllabus bears no trace of this approach. It is thus assumed that systematic geography is suited to younger students than to those in the high school. The writer has seen teachers who teach some topical geography to Forms 1 and 2 and traditional Regional Geography to these and the rest of the forms. However, systematic approach can be employed to any level and it is in fact of particular utility to high school students who are expected to write constructive and scholarly essays on definite themes illustrated by whatever areas.

Some research on Piaget's stages of development indicates that age determinants reported are always approximate, since the acquisition of skills is a gradual process influenced by prior concrete experiences and other environmental factors (McCartin, 1970). Citing a given age for attainment of specific learnings may be dangerous because there is the temptation to overlook the broad range of abilities found in learners of any age and to expect, for example, that all seven-year-olds have attained the level of Piaget's concrete operation stage or, conversely, that no eight-year-old is still operating at a preoperational stage. Equally misleading is the assumption that all students in secondary schools particularly those in Forms 5 and 6 and all adults have attained the level of formal operation stage. Indeed, 'There is evidence to suggest that not all adults reach the stage of formal operations. Estimates of adults who do not reach this stage vary between about 30 and 90 per cent' (Case, 1973, p. 24). Bruner (1962, p. 143) warns that we may be controlling behaviour by imposing irreversible limits upon the child with many of our practices in education in which teacher expectancy of certain levels of behaviour makes it difficult for the child to perform — the unexpected.

One advantage for conceiving readiness in terms of student's prerequisite capabilities is that maturation factors are not seen as primary determinants of selecting and organizing instructional content and activities. They are among the many factors that influence an educational process. Thus the danger of overlooking the broad range of abilities of students at any age of development is avoided. Unlike the vague "background of experiences" fundamental to the traditional conception of readiness, these prerequisite capabilities can be assessed at any time the need arises. By employing various assessment procedures to ascertain students' prerequisite learnings, it may then be found that students do or do not have all the assumed capabilities for particular experiences and adjustment of program component may be done to make instruction appropriate to the learner's ability levels.

Two other assumptions seem to relate to this discussion. The first is the notion of diffusion of innovations implicit in the 1973 syllabus. The belief seems to be that if over half of the selected and organized content is about the activities performed in the economically developed countries, students will be able to learn adoptable innovations from funded information on these countries. Usually, the major source of information is a textbook. One possible reason for this belief might have been the need to operationalize the "need to learn from what others do". It might have been hoped that knowing much about industrialization and mechanized agriculture in these countries would produce secondary school graduates most likely to transform Tanzania from agrarian to an industrial country or from subsistence-and-mixed-small holding agriculture to large-scale, mechanized agriculture.

It is right and proper that we should learn from what developed countries have done, are doing and will do. However, since not everything they do is desirable and applicable to our situations, we need to be selective. But, even if we are to select the most appropriate learnings from these countries, students will be at a loss if they will be required to deal with most of the information about other countries without enough and firm or well-grounded prerequisite learnings relevant to their own problems. Lessons from the First Five Year Development Plan made it clear that Tanzania cannot develop through wholesale borrowing of ideas from the East or the West. For example, one aspect of this plan which proved to be mistaken was our emphasis on the "transformation approach" - the opening of Government-financed new settlement schemes of a highly mechanized nature. This policy was too expensive in money and mistaken in its estimates of economic and psychological results (Nyerere, 1969). One major reason for the failure of this approach might have been the lack of prerequisite learnings by the people who were engaged in this process. Hence, the emphasis on "functional" adult education.

Even if the diffusion of innovations were the assumed goal, one wonders why the syllabus retains the Rhine Lands, The Vales of Britain and the like year after year, using static information from obsolete textbooks as if these environments were themselves static. Students will not effectively transfer information about other countries, learned in a capes-and-bays fashion, to solving home problems without adequate exploration of their cultural ecology. Suggestions made in the discussion on the criteria of scale might help to use information from whatever country in order to understand ourselves and others. Equally important, the selected instructional content must be really relevant if geography program has not to alienate our young people. Indeed, any content is useful providing it is relevant to the problem being investigated. Any investigation must not begin with an answer (someone else's truth) but must begin with a genuine problem, for as Kellum (1969) puts it, 'genuine relevance is established by beginning with a question' (p. 38). 'The intolerable burden of having to learn something that has no relevance is a species of torment that should be reserved for the deepest pit of hell' (p. 39).

The second assumption relates to what might be termed "reversal principle". One common suggestion made in educational literature is that program development sequence should be the reverse of the student learning sequence (Hill, 1970; Taba, Durkin, Fraenkel and McNaughton, 1971). Thus, given Hill's hierarchy of inquiry processes, (Figure 14) programming would begin with higher-order process of decision making and finish with observation, the lowest-order process along the scale. Likewise, the use of Bloom's Taxonomy would require program development to begin with evaluation and end with knowledge category. Once the planning has worked down the hierarchy ladder, the sequence of student learning activities is inversed. Student learning is, therefore, supposed to proceed from simple to complex or from specifics and concretes to more abstract learnings. Such instructional sequence is assumed to provide an incremental (cumulative) sequence of learning activities where each step builds on the previous step and leads up to the next (Hill, 1970, p. 334). It also assumes maturation.

As Popham and Baker (1970) point out, however, basing the design of instruction solely on a knowledge or any other lowest-order-first strategy does not help much in ordering different behaviours and acts within that category or within higher levels. Secondary school students, even those in Form 1, have had some prerequisite experiences in geographic education. It would be wrong to assume that student's repertoire is a blank slate, that his cognitive structure entirely lacks subsumers upon which new learnings have to be built. Students already possess certain geographic prerequisites of different types and at various levels. What the educator might not know are the types and levels of prerequisite learnings the student already possesses.

Moreover, there may be situations when both programming and instruction are moving up or down the hierarchy of instructional objectives. And due to the interlocking nature of domains it may even be difficult to exactly identify the types and amounts of knowledges, processes, attitudes and values a student employs in a particular instructional activity. Some types and levels of learnings will overlap, and others will be attained and used simultaneously and subconsciously. Thus, any sequence of instruction is likely to change with daily and momentary classroom situations. It is not unusual for content planned in the pre-active stage not to match exactly with what students and teachers do in the active stage. It, therefore, seems impossible to maintain instruction solely based on reversal principle. The problem the teacher faces is to establish the level at which the students, whether individually or groupwise, should start a particular activity. The word "start" in not merely limited to the beginning of a term or a year's course. It also includes a particular lesson or period. Pre-assessment of student prerequisite capabilities will help the teacher to detect the students' ability levels about which instruction can begin.

Top-down mode of program development is one reason for some educators to have tended to divorce programming process from instructional process. For, the "specialist" programmer, somewhere outside the school environment, develops a program which has to be used by the assumed students and teachers. Here, the specialist is the producer, the teacher and students (school) are the consumers; hence, the supply-and-demand model pivoted on competition. Competition works such as to compete teachers and students out of the supplying of funded knowledge to the market and out of program development process. When teachers and students question the nature of such a system the monopolist shuts their mouths by convincing them that they do not have enough intellectual abilities to fund knowledge and to develop a program and when the situation is acute the monopolist plays economic games of cutting down the supplies, creating shortages and raising prices of his products. Income incentives in education might work with minimal detrimental effects on student learning when competition is not monopolistic and is not at its extreme end of exploitation. As we have done before, such process of program development based on dangerous assumptions of economics must be guarded against and/or eradicated. Both programming and instruction are interdependent and dependent on the prevailing nature of the learner. Programming, like instruction, should be conceived as a continuous process rather than a mere preparation of fixed lists of topics, objectives, instrumental content and suggestions on instructional activities to be dealt with in a particular direction. Both programming and instruction should be cooperative or shared rather than competitive processes. At a desirable level, competition is subsumed within and subordinate to cooperation. Programming, like instruction, should base on the proximity principle, that is, should be undertaken at the point of implementation.

The principle of reversing instruction which is based on the hierarchy of concepts is definitely a useful guide for sequencing instruction. However, the hierarchical sequence should be flexible enough to allow for changes in students' abilities for performing certain activities at a particular and unexpected time and type and level of learnings.

4. Spiral Development

Related to the hierarchical organization of instructional content is Bruner's (1963) idea of spiral development of an instructional sequence. The hierarchical nature of the concepts makes it impossible to develop them fully in one unit or even on any one form level; they must be dealt with on several form levels and in different units.

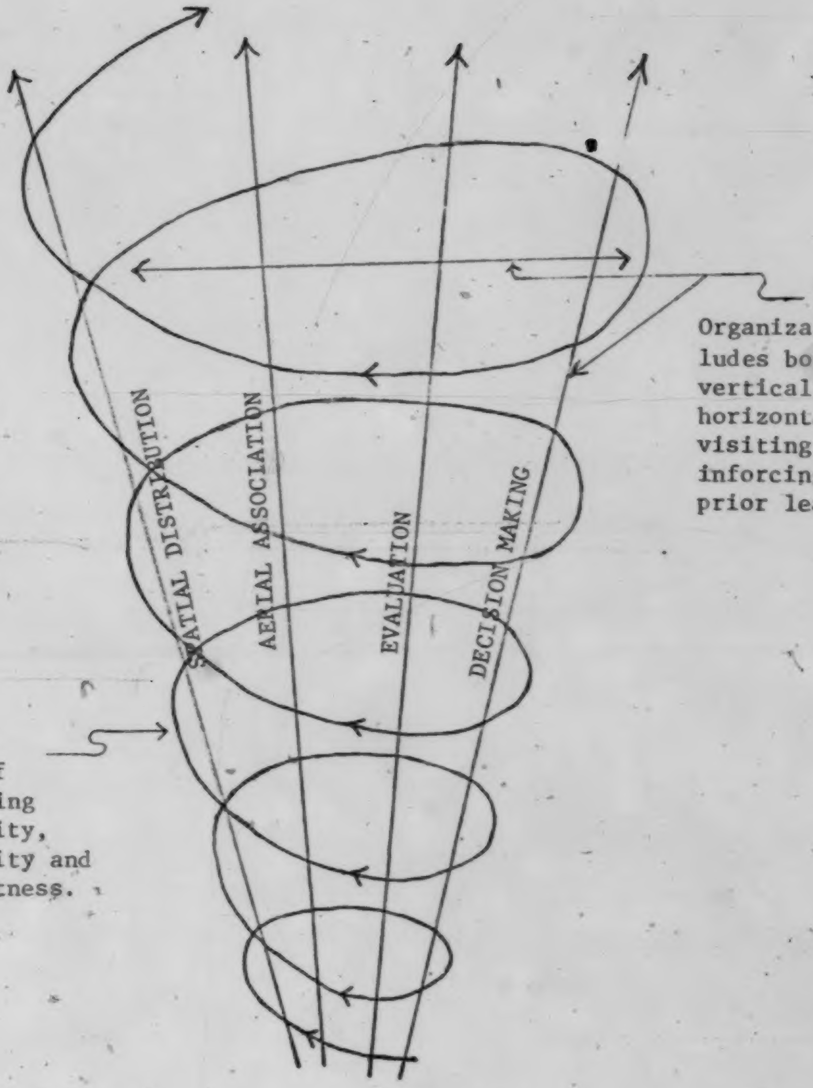
By spiral development it is meant that the structure of the instructional content should allow ideas to be used over and over again, and in progressively more complex form. As the instruction proceeds, it should revisit these fundamental ideas repeatedly, building them into a spiral development until the student has grasped the full formal apparatus that goes with them. 'The concepts must be visualized as threads which appear over and over again in a spiral fashion but which always are moving to a higher level' (Taba, Durkin, Fraenkel and McNaughton, 1971, p. 20). Popham and Baker (1970, p. 64) seem to give the impression that this notion is out-dated. Certainly, it still has an educational utility.

A spiral program might become a vehicle for developing and reinforcing student's self-confidence. For, within a carefully thought out and well-structured course, unit or activity, the inquiry method can be used to bring out a sense of excitement about discovery of regularities and similarities between ideas previously unrecognized. The idea of spiral development is indeed not new to many teachers. Teachers usually employ techniques to have students recapitulate their work after certain blocks of time or any time such activities deem necessary. However, tentative planning for spiral development is likely to solve the problem of some teachers and other programmers tending to pay it a lip service. Continuous evaluation of student performance and program components will provide information upon which to decide on the extent the student should "leap" back and forth along the hierarchy ladder of objectives.

Spiral development thus ties with the notion that student learning is facilitated if students revisit what they had previously learned. Instructional content should, therefore, be conceived as developmental rather than terminal. Although instructional obejctives are in psychology labelled "terminal", it is wrong to think of them as being something to be achieved once and for all at a particular time and level. Moreover, previously acquired learnings are likely to be forgotten if not re-used in subsequent encounters. Prior learnings which the student has in his existing cognitive structure act as means of learning the new content. Thus what is called "terminal" actually becomes not the end as such but the means of continuity of the learning process. Learning is never terminal but a life-long process. There should always be a developmental approach in visualizing and implementing objectives, so that depth, breadth and sophistication increase gradually as the educational level of the learner increases. Figure 24 illustrates the spiral view. The level of sophistication and of exploration of particular concepts and ideas will primarily depend on the nature of the learner.

II. A PROGRAM MATRIX: LEVELS OF INTENDED LEARNING OUTCOMES

This section is intended to illustrate how intended learning outcomes might be organized into different levels of generality and specificity. These levels have been observed in previous discussions, but they are revisited for two main reasons. First, since the syllabus uses the term "objectives" for "goals" it must be made clear that these concepts are not synonymous. Second, because country listing is among the persistent traditions inherited from the past syllabi, a need exists to illustrate how intended learning outcome listing might be achieved. This presentation should not imply that instruction follows such neat levels, nor should it mean advocacy for unilinearity.


SPATIAL DISTRIBUTION
AERIAL ASSOCIATION
EVALUATION
DECISION MAKING

Spiral Organization includes both vertical and horizontal revisiting and reinforcing of prior learnings.

General trend of developing generality, complexity and abstractness.

FIGURE 24: Spiral Development of an Instructional Program (After Taba, Durkin, Fraenkel, McNaughton, 1971, p. 21; 29).

Three levels of intended learning outcomes are identified as forming a program matrix. These are program goals, program sub-goals or "unit" intended learning outcomes, and instructional objectives or "activity" intended learning outcomes (Bacchus, 1972; High School Geography Project 1969). This distinction assumes that the specification of the overall aims of education is not a direct responsibility of a program developer. The choice and formulation of the philosophy of education of the society is the concern, at least in our case, of every free citizen through the national democratic machinery. The aims of education for self-reliance which form the present national philosophy of education are partly the product of the deliberation of the representative government created by the electorate through the ballot-box and partly the product of unfunded belief system which pervades our day-to-day lives.

The societal aims of education are derived from both extended and decision environments: from policy statements, from public opinion, from politicians, parents, educators and students, from world trends, levels of development, cultural and historical trends and realities, from psychologists and from other informed sources. We can, therefore, assume that program developers take the philosophy of education as given despite their contributions to it as free citizens or as consultants. The philosophical, idealogical statements form the belief system of education and act as a symbolic totem pole around which program developers dance as a sign of reaffirmation of royalty, commitment and dedication to a common cause. Unlike the goals and objectives, these value-laden philosophical statements change very little over time (Bacchus, 1972, p. 4; Rhodes and Lomas, 1972, p. 6). As their duty, program developers should analyze these broad societal aims of education, interpret their demands and put them into action.

In criticizing Tyler's rationale Kliebard (1975) seems to be worried about the notion of being consistent with the philosophy:

> 'We are urged only to make our educational objectives consistent with our educational philosophy, and this makes the choice of objectives precisely as arbitrary as the choice of philosophy. One may, therefore, express a philosophy that conceives of human beings as instruments of the state and the function of the schools as programming the youth of the nation to react in a fixed manner when appropriate stimuli are presented' (p. 77-78).

Certainly, Kliebard is suggesting something - that the 'consistency can be as much a sin as a virtue' (p. 78). It should thus be realized that the problem is not consistency _per se_, for man has to be consistent with some line of thought, attitude or value. But it is what man is consistent with at a particular time and place that matters. Kliebard realizes that man should not be or be made to become consistent with dehumanizing philosophy which conceives human beings as machines or rats and monkeys. The means of being consistent with something also matters. The philosophy which conceives education as a process of changing human behaviour by means of 'hypnosis, shock treatment, brain-washing, and torture' (Kliebard, 1975, p. 74) is definitely dehumanizing. But the "reconceptualists" need to ask some other serious questions: Should the nation have the philosophy of education? What for? How should this philosophy be formulated? By whom?

Our stance is clear. Tanzania should at all times have an educational philosophy. What is crucial is that such a philosophy should base on the reality of life. It should aim at making man humane; it should be a personalizing philosophy. It should be subject to change in the light of democratic means. Like instructional objectives, general aims and goals of education may arise out of and change as a result of our conscious actions. Thus our philosophy needs continuous evaluation. True democratic cooperation in formulating and evaluating the philosophy of education should involve every free citizen, students included.

Tyler's (1950) treatment of the philosophy of education and in fact the psychology of learning is of course questionable. The distinction between "educational and social philosophy" and "contemporary life" is rather tautological because any nation's philosophy is a key component of its contemporary life. Tyler illustrates this by stating that 'One section of an educational philosophy would outline the values that are deemed essential to a satisfactory and effective life' (p. 34). Tyler then outlines the democratic values likely to influence the life of people and their education in a democratic society. The prevailing philosophy of education is obviously part of the contemporary life of the society.

Tyler's distinction between the use of a psychology of learning and the studies of the learners is equally tautological and arbitrary because psychology of learning actually deals with the nature of the learner. With the philosophy of education being part of the nature of the society and psychology of learning being a consideration of the nature of the learner, Tyler's two "screens" turn out to be the criteria for selecting and/or organizing instructional content and other program components.

The chief function of stating the societal aims of education on such general level is to provide an orientation to the main emphasis in all educational programs of instruction for all the school systems of the society. In themselves, these aims are insufficient as a means of translating the needs and values of the individual and of the society into an educational program. They are insufficient guides for a program designer in deciding about program components and processes. General aims must be broken down into program goals, program sub-goals and instructional objectives. The relationship between these levels of intents is illustrated in Figure 25. This relationship between the aims of education, goals and objectives is not uni-linear, nor is it fixed and all levels influence one another. In fact, such a distinction of levels of intents is possible theoretically but may hardly be discernible during action.

From the analysis of the aims of education for self-reliance, one might tabulate them as follows (Auger, 1970, p. 31):

1. Values:
    - human excellence and dignity
    - equality and respect of individuals
    - human rights and corresponding obligations
    - society and its common good
    - dignity of labour

2. Attitudes:
    - a sense of responsibility (commitment) to the total community, which implies a sense of responsibility in one's personal activities.
    - sense of cooperation and "togetherness"
    - an inquiring mind, which includes the ability to learn from others.
    - a basic confidence in one's own position.

3. Skills and Knowledge:
    - meaning of democratic socialism and self-reliance
    - theoretical and practical knowledge, skills and processes related to social life.

- theoretical and practical knowledge, skills and processes related to one's vocation in life
- the cooperative skills and processes

Level 1: Program Goals

Program goals or general intended learning outcomes which provide the major orientation for entire course of study in a school system, for example, a secondary school system, can be derived from the above categories of the aims of education for self-reliance. Program goals include the overall knowledge, skills, values and attitudes intended to be achieved by students during their secondary school education. For instance, three such goals are stated for the Provisional Geography Syllabus for Forms 1-4 (Appendix I). The following are other examples:

- that the program should try to teach or illustrate some ways the field of geography looks at the world, some of the kinds of questions geographers ask about the world.
- that the program should enable students to apply problem solving skills and attitudes and basic geographic concepts and related learnings from the real and decision environments to answer questions and reach solutions to the various problems.

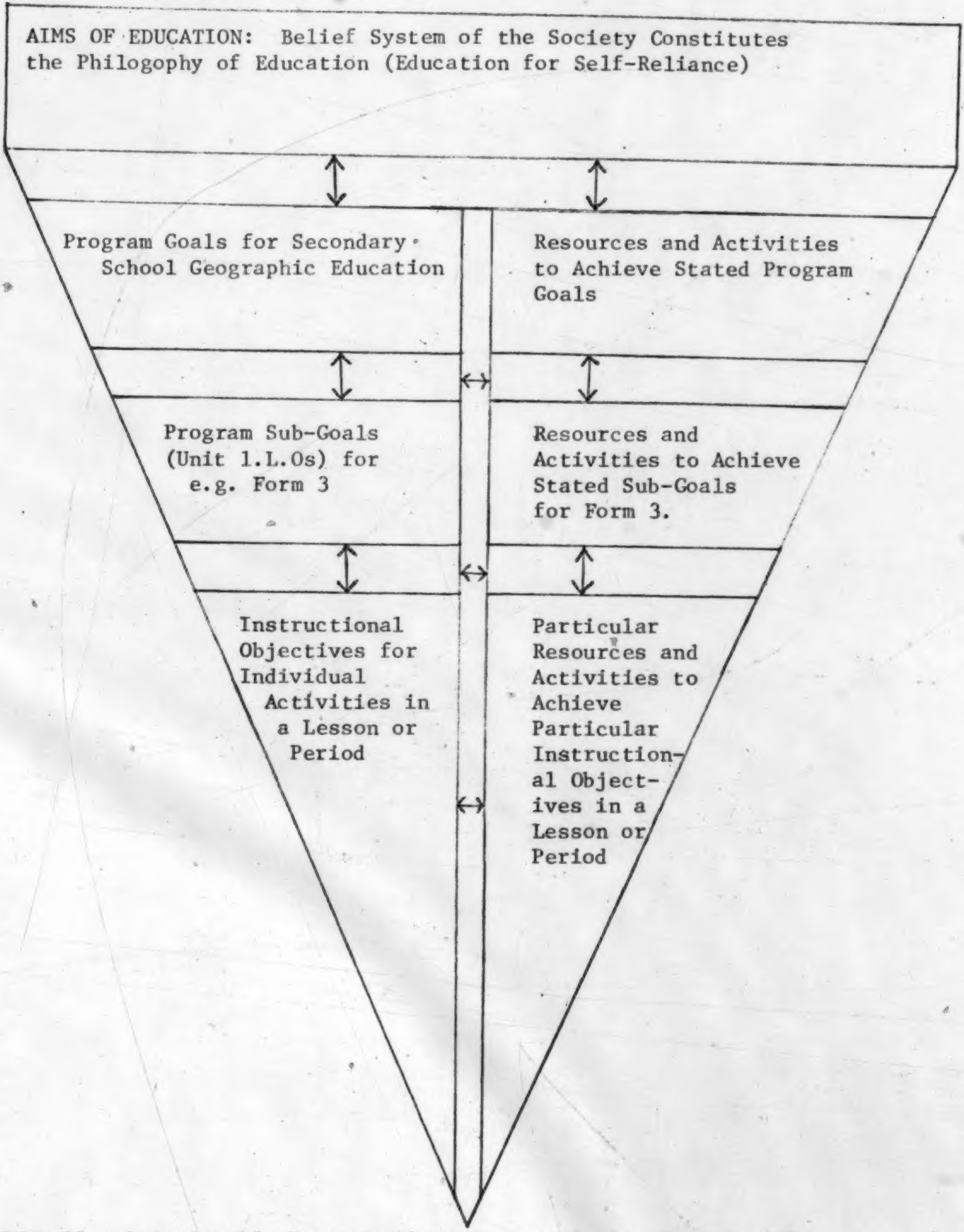

AIMS OF EDUCATION: Belief System of the Society Constitutes the Philogophy of Education (Education for Self-Reliance)
Program Goals for Secondary School Geographic Education
Resources and Activities to Achieve Stated Program Goals
Program Sub-Goals (Unit 1.L.Os) for e.g. Form 3
Resources and Activities to Achieve Stated Sub-Goals for Form 3.
Instructional Objectives for Individual Activities in a Lesson or Period
Particular Resources and Activities to Achieve Particular Instructional Objectives in a Lesson or Period

FIGURE 25: Relationship Between Aims, Program Goals, Program Sub-Goals and Instructional Objectives in Program Development and Instruction (After Bacchus, M.K., 1972, p. 7).

Level 2: Program Sub-Goals (Unit Intended Learning Outcomes)

Program sub-goals are goals for each unit of the overall program; thus they can be referred to as unit intended learning outcomes. Ideally, these intents are derived from the program goals and are intended to be achieved by a particular form level. Thus, to achieve the sub-goals, sub-programs or units are designed for each form level and, these put together, constitute a complete program for the entire secondary school system.

Suppose, for example, the program aims at the "improvement of the country's economy". We might link this aim to the program goals which have a bearing on the problems of improving the economy through geographic education for self-reliance. Bearing in mind that over 85 per cent of our economy depends on agricultural sector, we might decide to emphasize on students' acquisition of problem solving skills, values and attitudes and geographic concepts and principles which would allow students to act on data in Agricultural Geography. In order to ensure for comprehensiveness and significance of content selected, taxonomies of educational objectives and structures of geography might be employed to identify the program sub-goals and instrumental content. Examples of sub-goals for a unit might be that a student should:

- know the meanings of average rainfall, effective rainfall, reliability of rainfall and water balance.

- anticipate and account for the probable locations and distributions of rural economic activities in terms of transportation, pattern of settlement, and physical environment.
- account for and anticipate patterns of rural and urban land use in terms of transportation and physical and biotic processes.
- use weather charts, maps, statistical and other data from a variety of sources to make hypotheses and test them.
- map cultural ecological phenomena influencing agricultural activities.
- develop positive attitudes toward agriculture, preservation of soil resource and be able to use it wisely.
- feel that there is nothing mean in working on land, for agricultural activities can be made scientific, productive and rewarding.
- use theories to account for and anticipate rural settlements and land use patterns.

Level 3: Instructional Objectives (Activity Intended Learning Outcomes)

From listings of program sub-goals there would emerge instructional objectives translatable into instructional activity. The following examples illustrate instructional objectives which could focus on agricultural problems:

- interpret climatic data and relate it to the production of cotton.
- discover the relationship between soil types, drainage patterns and types of crops grown.
- suggest possible locations for the fertilizer industry.
- practice in making decisions and in applying what she knows to problems of settlement pattern.
- evaluate the implementation of agricultural policies.
- feel ashamed of despising rural life.
- appreciate the efforts of peasants for supporting a large segment of the economy and of the population.

At first sight these instructional objectives might appear to be far removed from the general aim of "improving the economy of the country". In actual fact they are very close to it. The relationship between program goals, sub-goals and instructional objectives should be such that they can be seen in the light of the developmental process. Each activity intended learning outcome should facilitate the acquisition of the unit intended learning outcomes which in turn should facilitate the acquisition of the more general program goals and the societal aims of education.

This chapter has focused on the organization of instructional content (objectives and instrumental content) "within" an instructional program. This should not be confused with discussions on the "between" content organization which is sometimes termed "patterns of curriculum organization". The debate as to whether geography should or should not be taught as a separate field of study, a social science, a natural science, an inter-disciplinary or a multidisciplinary program is here reserved for future consideration. However, one clue is already provided: that geography is not divided between physical and human geography. This implies that geography is not necessarily a natural science or social science but both. A decision whether or not to place geography in either of these categories should be reached after rigorous investigation of the reasons that tend to reinforce the dualism between social sciences and natural sciences, and those tending to preserve the disciplinary organization of content.[2]

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[2] Interested readers may begin with Harvey (1969, pp. 27-83); Murphy, (1973, pp. 2-10); Roszak (1969); and Bernstein (1971).

CHAPTER V

INTENDED ACTIONS: LEARNING EXPERIENCES AND TEACHING STRATEGIES

Education for self-reliance demands that students "learn by doing" and that education should develop in each citizen an inquiring mind, an ability to learn from others and a basic confidence in his own position. This is an explicit call for teaching and learning by enquiry.

This chapter focuses on the problem of an experience and of the criteria for selecting learning experiences; the concept of inquiry and inquiry teaching and learning; some suggestions on the organization of courses, units and lessons; and finally, some viewpoints on the integration of the school with the community.

I. THE PROBLEM OF A LEARNING EXPERIENCE

Beyer (1971) emphasizes the significance of distinguishing between teaching strategies and learning experiences when he states that one reason for a general vagueness about inquiry teaching is a tendency to equate teaching and learning. 'Teaching is what teachers do. Learning is what learners do' (p. 7). The relationship between the two is such that the 'most effective teaching is built directly on what we know about learning. Unless we understand how children learn, we cannot design experiences that will lead to purposeful learning' (p. 7).

"Experience" is another concept in education which remains controversial. Johnson (1968), for example, argues that whether experiences are viewed subjectively in terms of the sensibility of the experiencing individual or objectively in terms of his actions in a particular setting, there is in either case no experience until an interaction between the individual and his environment actually occurs. And by stipulating that curriculum is a structured series of intended learning outcomes, Johnson conceives experiences as instructional, not a "curriculum" affair. He argues that decisions regarding the learning experiences to be provided are the result of instructional planning, not of curriculum development.

Other educators, however, conceive experiences as one of the "content" components of a curriculum. For example, Stewart (1974) writes: 'Curriculum content includes the facts, concepts, principles and experiences which make available to students knowledge, skills and values for acquisition, development and internalization' (p. 70). Yet Gagné (1967) defines curriculum content in terms of overt, measurable behaviours of the learner or such expected behaviours. Gagné states that 'content needs to be stated as objectives, and that these objectives mean things that the student is able to accomplish. More specifically, content may be defined as descriptions of the expected capabilities of students in specified domains of human activity' (p. 21). Many educators, however, view the selection and organization of learning experiences as processes of curriculum development. Most of these educators base their views on Tyler's (1950) rationale. Kliebard (1975) thinks that one problem of conceiving learning experiences in terms of Tyler's rationale 'is how can learning experiences be selected by a teacher or curriculum maker when they are defined as the interaction between a student and his environment. By definition, then, the learning experience is in some part a function of the perceptions, interests, and previous experiences of the student. At least this part of the learning experience is not', Kliebard argues, 'within the power of the teacher to select' (p. 78). Kliebard also points out the problem of "control" when he states that 'While Tyler is explicitly aware of this (definition), he nevertheless maintains that the teacher can control the learning experience through the "manipulation of the environment in such a way as to set up stimulating situations - situations that will evoke the kind of behaviour desired". The Pavlovian overtones of such a solution are not discussed' (p. 78). Thus one problem of an experience is related to the psychology of learning and its implications of controlling human behaviour.

In this study, however, learning experiences are viewed as synonymous with student's "learning activities" or his "learning opportunities" and are defined as the operations, intellectual, physical or emotional, which the learner employs to transact with the environment in order to achieve the educational goals and objectives. In this sense, learning experiences are not merely mental operations (Taba, 1962). The term transaction implies that man acts upon the world (total environment), and changes it and he is changed in turn by the consequences of his actions.

According to Dewey (1938) 'interaction is going on between an individual and objects and other persons. The conceptions of situation and of interaction are inseperable from each other. An experience is always what it is because of a transaction taking place between an individual and what at the time constitutes his environment' (p. 43). It is along these lines that Tyler (1950) states that "learning experience" refers to the interaction between the learner and the external conditions in the environment to which he can react.

Dewey (1944) further stated that the nature of experience can be understood only by noting that it includes an active and passive element peculiarly combined:

> 'On the active hand, experience is trying - a meaning which is made explicit in the connected term experiment. On the passive, it is undergoing. When we experience something we act upon it, then we suffer or undergo the consequences. We do something to the thing and then it does something to us in return: such is the peculiar combination. Mere activity does not constitute experience. Experience as trying involves change, but change is meaningless transition unless it is consciously connected with the return wave of consequences which follow from it. When an activity is continued into the undergoing of consequences, when the change made by action is reflected back into a change made in us, the mere flux is loaded with significance. We learn something' (p. 139).
> 'To "learn from experience" is to make a backward and forward connection between what we do to things and what we enjoy or suffer from things in consequence (p. 140).

Dewey's conception of an experience as primarily an active-passive affair was prompted by the traditional school's beliefs in academic rationalism by which student's mind was only engaged in absorbing knowledge directly and, hence, became severed from the physical organs of activity. Dewey's active element of an experience implies that the learner is an active participant, that he has to experiment with the world to find out what it is like. The undergoing element of an experience implies that the learner makes a discovery of the connection of things.

Another way of looking at the active and passive elements of an experience is to view them in terms of temporal dimension. Whatever man does has this dimension. Man does intend to act upon phenomena in the future. Any intent, be it aim, goal or objective, refers to some future time which may be extremely immediate or very remote. Although the active element of a particular experience does not occur until the individual activates the environment, the passive element of a prior experience implies that the new experience (which connects with and stems from the undergoing consequences of the prior experience) may be intended and planned before it actually happens. This holds for any advanced planning, be it educational, economic or whatever. Conscious planning for future experience is the manifestation of the consequences of the prior, yet undergoing, experiences. The prior experience forms the basis for blueprint preparation for the next experience. In other words, an individual may list a number of things he intends to do or he may keep them inertly in his own mind. Any intended experience is static or passive. They are these blueprints or passive activities of students which fill finished kits of units and teachers' lesson plans and our individual diaries.

Kliebard (1975) quotes Dewey's argument: "Ends arise and function within action. They are not, as current theories too often imply, things lying outside activity at which the latter is directed. They are not ends or termini of action at all. They are terminals of deliberation, and so turning points in activity". Then Kliebard adds: 'If ends arise only within activity it is not clear how one can state objectives before the activity (learning experience) begins' (p. 79). Certainly, Dewey's above statement explicates the complex interrelationship between ends and actions or objectives and experiences. It implies that one may intend to act as a result of his prior action. It is not impossible for one to state his intended action and resources to work toward that end which arises in the prior action. We may state objectives before the activity begins because the objectives are passive things which are the result of the consequences of prior experiences. One problem in education is the practice of assuming instructional objectives, that is, having students work toward goals and objectives which do not arise out of their own activities. It is this myth in education that we must question. Here, students do not intend as a result of their actions but someone else acts and intends for them and controls students such that they repeat or copy his actions and their consequences. This is the major strategy of the academic rationalists. However, since the teacher has a legitimate share of the instructional scene, he may have a clue of the intents of the student; he may, but tentatively, plan to facilitate student's action. The teacher has an idea, however slight it may be, of the consequences of student's actions. It is this knowledge and the fact that he has to facilitate student learning that the teacher may prepare a blueprint of student's objectives and experiences. But, for sure, this blueprint is not synonymous with the actual activity of the student.

Further consideration of the blueprint or passive objectives and a passive element of an experience explicates some key issues in education. One of them relates to the meaning of a statement of an instructional objective prepared before instruction. As previously observed, any statement of an instructional objective includes a verb which may be in overt or covert form. In either case, this verb implies or represents (in the case of one-to-one relationship) what a student will be able to do after instruction as well as what he will do during instruction. This argument does of course violate the common belief that instructional objectives are merely what the student will be able to do after the lesson is completed, not what the student will be able to do during the lesson (Charles, 1972, p. 58). It is argued here that objectives also mean what a student will do during the instructional expisode.

In its blueprint, static or passive form, a learning experience is a component of a statement of an instructional objective formulated during the pre-active stage of programming. Such an intended experience is transformed into an activity during the active stage and becomes the outcome of instruction after an instructional episode. It should be noted that such an arrangement assumes pre-planning of instruction. More assumptions underlying this arrangement are discussed below.

An intent does not mean the same thing as an actual outcome of an activity performed to achieve it, for the latter might be more than or short of the original intent. These "pluses" and "minuses" are often termed payoffs or side effects of an instructional activity. The cases in which the intent, instruction, and actual outcomes are exactly in one-to-one relationship are probably coincidental because if man is not infallible, the chances for him to think and act exactly in the way it was intended are indeed very slim. This is why any plan of instruction is always tentative rather than an exact prediction of what the learner will do during instruction. However, as it will be stressed later, mechnistic education by which a student learns in very controlled conditions is likely to achieve an apparent one-to-one relationship between intents, instruction and outcome. Skinner's teaching machines are a case in point.

The active component of an experience implied or represented by a verb referred to above is often labelled "behaviour". Broadly interpreted, 'behaviour means any physical or mental activity, whether or not its operation can be seen by an outside observer. Therefore, the term encompasses covert mental acts like understanding, appreciating, knowing, enjoying, hating, and considering as well as overt physical acts like hammering, drawing, singing, playing an instrument, reading aloud and discussing' (Thomas and Brubaker, 1971, pp. 150-51). Thus, the term "behaviour" is not synonymous with the concept of "instructional objective" because in blueprint form the former is merely one of the components of the latter. It can be noted that the above definition of "behaviour" is synonymous with that of a learning experience. Both refer to student's operations he employs in learning and both are often referred to as "what the student does that he learns and not what the teacher does". Although psychologists have popularized the label "behaviour" to the extent of eliminating the label "learning experience", both terms really mean the same thing.

There has been a concern to distinguish between "behaviour" and "action" (Braybrooke, 1965, pp. 1-18; Aoki, 1974). This distinction is unfortunately beyond the scope of this study and the writer even treats learning experiences and teaching strategies as actions. It is, however, possible that the two concepts are different and may as well be interrelated in a complex manner. But any humane discussion on human behaviour must distinguish between Skinner's "organismic" or biological behaviour and human social-oriented behaviour. Skinner, with his strong belief in reinforcement model, insists that human beings behave like other organisms. What he has been doing is just to observe other animals' behaviours and equate them with human behaviours with no regard to what is humane in man as a being of praxis. If man is a being of freedom, if his actions are based on his consciousness of intentionality, if man is a social being, his behaviour must be different from that of Skinner's experimental rats, dogs and monkeys. Something humane that distinguishes man from other living things must also characterize his behaviour. Human behaviour must be humane, social-transactional. A distinction between human action and human behaviour which overlooks what is humane in us is likely to equate man with any other non-human organism.

However, it is primarily for the purpose of evaluation undertaken after instruction that the phrase "what the student will be able to do after instruction" has become common. But even this solely depends on what happens during instruction. The assessment of student's prerequisite learnings requires the student to undergo experiences provided not before but after instruction. Without instruction, be it formal or informal, there cannot be such an assessment. Student's expected capabilities to perform an activity after instruction are initially demonstrated during classroom transactions and teachers do not necessarily have to know whether or not the student has acquired or used certain capabilities, by always conducting pre-and-post-instruction assessments which use criterion-referenced tests and overt, measurable objectives.

The claim that instructional objectives should be stated in terms of the student's behaviour and not in terms of what the teacher does is indeed warranted, for we need to focus on what students do that they learn. But, is it true that teacher-oriented or so-called "teacher objectives" are entirely useless? Do we teachers need to state our teaching objectives? Do we at all say to ourselves that we are going to teach this or that and in this or that way? Is the intent combining student activity and teacher activity entirely undesirable?

Although the style of stating objectives in terms of learner's activity is useful, it is only one way of stating instructional objectives. Other ways are possible and may equally be useful. An instructional objective may be teacher-oriented and yet indicate precisely what the student will do or will be able to do. For instance, it might be stated that "I will use inquiry strategy to enable a student to transform a picture into a sketch map", or that "Through questioning technique and by supplying needed data, I will guide the student to test his hypothesis". Such statements might as well be as specific as those entirely stated in terms of the behaviour of the learner. They also aim at facilitating student learning.

Furthermore, objectives stated in terms of student's activities may or may not imply what the teacher is required to do before, during and after instruction. For purposes of educational evaluation, intents can be stated in terms of any phenomenon that has to be evaluated. The suggestion here made is not that we should abandon stating objectives in terms of student's activities, but that even teacher-focusing objectives are not as worthless as the advocates of the "new" style would wish us to believe. It might prove true that when the self consciously intends to help or guide another self that self naturally sets its objectives. And one strongest motivation for an individual to perform is the determination to achieve self-focusing objectives. In fact teacher-focusing objectives imply that the teacher is aware of what he has to do in order to facilitate student learning. They imply that teachers should always ask themselves what they should do in order to effectively aid learning. Such objectives will not turn instruction into being teacher-dominated, for this shortcoming in education is not the result of styles of stating objectives but a question of authoritative strategies used by domineering, power-hungry educators. It is the result of the preoccupation with controlling student behaviour rather than teaching for student learning.

Aoki (1974, pp. 92-93) distinguishes between instructional situations in which objectives are prescribed by an external person (teacher or curriculum designer) and an instructional situation in which the student is involved in the generating of goals and objectives. In the former, the problem for the curriculum designer is to select goals and objectives for the students. In this situation the discrepancy between teacher objectives and student objectives and, hence, the conflict between the two humans, are possible. The entire program might in this situation be given to the school by the specialist producer. In the latter, the problem for the curriculum designer is to help students design and evolve goals and objectives. Thus the crucial element in this distinction is student involvement in program development process.

Kapfer (1970) bases on Johnson's (1968) rationale of curriculum to distinguish between "curriculum theory" and "instructional theory", Kapfer states that curriculum theory is concerned with the 'derivation, specification, mediation and assessment of behavioural objectives' and instructional theory 'is concerned with the environmental conditions which are necessary both for the student to acquire the desired behaviours and for him to develop positive attitudes toward learning and toward himself as a learner' (p. 14).

In terms of Aoki's instructional situation in which the student is involved in development process, students engage in curriculum theory as defined above. Activities of curriculum theory become student's experiences. Here, a student becomes a program designer as well as a participant in instructional theory as defined above. Under such circumstances both theories co-exist; are joined by student involvement. This implies that the separation of the "curriculum development" and "instruction" stipulated by Johnson holds only when learners' involvement is eliminated from his "curriculum development system". In terms of modes of curriculum development, it may be concluded that Johnson's separation of curriculum development and instruction is based on a top-down or as Blaney (1970, pp.13-23) calls it, an "Institutional Mode of Curriculum Development". This separation is thus based on the belief that the specialist (In-Here) has the right to feed his objectives to the teacher and student (Out-Theres), that instruction should be geared to the acquisition of specialist objectives and possibly by using strategies and instrumental content prescribed by this specialist, and that things should go as the specialist wishes the Out-Theres to do. Of course such teaching-and-learning process suffers from a high probability of proceeding in accordance to what the specialist thinks is true and good for the Out-Theres. Indeed this is the price for all educational models predicted on the assumptions of a top-down mode of program development. Since there are so many topping specialists in such a situation, the practice also extends in the classroom instruction. The teacher also imitates the specialists above him and tops the students and develops rigid, unchallengeable authoritative practices in whatever instructional situation he arranges. Probably students also copy their teacher to imitate and top each other.

Another point related to Johnson's rationale is that, if it is possible that in its passive form a learning experience is embedded in the instructional objective, and that this objective may be pre-specified by an external person (the decision which automatically pre-specifies the learning experience), it then follows that the selection, organization and evaluation of static, funded intended learning experiences are matters of "curriculum", for in this case these processes are not part of classroom transactions. What Johnson calls "instructional planning" is certainly a pre-active, non-transactional activity; it is a process of curriculum or program development, though it might be made instructional through student involvement. For, what are the activities of instructional planning, if not those which the specialist is working hard to take away from the teacher? There is no instructional planning which does not involve selection and specification of tentative instructional objectives and this is a key task of any person worth calling a classroom teacher. That a student should be engaged in program development process is one key intent of education for self-reliance. However, should teachers become back-benchers in program development process, the students, too, will take the same role since, for him to effectively participate in programming, he needs, at least at first, teacher guidance. This means that teachers should not be "topped" but be guided so that they become conversant with program development process itself.

A learning experience can be referred to as content only if it is regarded as a component of an instructional objective. This is because, as an intent, an instructional objective is a static component of instructional content. In fact, instructional objectives should be seen as part of the teaching-learning-environment with which a student transacts. In generating his own objectives and designing instrumental content, and in the process of transforming the real world environment into the decision environment, the learner, aided by the teacher, creates his own learning environment. Thus students have to act upon objectives generated by external persons rather than be imposed on them.

Johnson (1968) states that a learning experience consists of an activity component and a content component. But if an instructional objective also at least consists of the same components (Krathwohl, 1964) and if an intended experience is part of an objective, this experience cannot have a content component although it may in its static form be treated as content. Of course, there must be some form of environment on which the student has to act or manipulate. Thus, human activity demands an environment or situation. Although a situation and a learning experience are interrelated, they are by no means synonymous concepts.

II. SOME CRITERIA FOR SELECTING WORTHWHILE LEARNING EXPERIENCES

This section suggests some criteria that might help to illustrate the act of selecting appropriate, passive learning experiences. They might also help in evaluating student-initiated activities. One point should first be noted, however. Taba (1962, pp. 263-67) argued that the criteria for selecting learning experiences must be distinguished from those for selecting "content". It is not clear to the writer whether or not Taba treated the two types of criteria as mutually exclusive. However, such a conception is possible if content is seen as merely consisting of "subject matter" of the "disciplines" and probably also the teaching materials. But if content is broadly interpreted to include the instructional objectives as well as the instrumental content, and since expected student's activity is a component of an instructional objective, it becomes clear that some criteria used to select instructional content will also apply to the selection of intended learning experiences. The overlapping of these criteria is the result of the two forms of an experience. Learning experiences can, in the case of advanced planning, be listed in the hope that students will probably undergo them during and after instruction. However, the purpose for suggesting the criteria for selecting learning experiences is just to focus upon the intended actions of the learner rather than any other component of an instructional objective or of a program. The selection of intended learning experiences should be done at the same time the instructional objectives are being selected. Any list of student activities is a mere guide of the classroom transactions; it should not be mandatory, for it might turn out to be an instrument of dictating someone else's truth to students.

1. Needs and Interests of the Learner

As Tyler (1950, p. 66) points out, the learning experiences selected must be such that the student obtains satisfactions from undergoing those experiences. If, for example, the student has to develop skills in solving agricultural problems, he should not only get the opportunity to solve these problems, but also the effective solution to the problems should be satisfying to him. This requires the teacher to investigate and know about the learner's needs, interests and about human satisfactions in order for them to judge whether or not given learning experiences are likely to prove satisfying to the students involved. Studies of motivation in psychology, sociology and other fields of study, the hierarchies of human needs such as that proposed by Abraham Maslow will be of help in meeting this criterion.

2. Student's Prerequisite Capabilities

The learning experiences provided should be within the range of the prerequisite capabilities of the learner involved in those activities. The new experiences should, in other words, be appropriate to the student's prior experiences. As Tyler (1950) puts it, "The teacher must begin where the student is" (p. 67). Thus the teacher should assess the prevailing capability levels of the student in order to ensure the appropriate level at which the activity has to be performed. In order to accomodate for variations in students' needs, interests and capabilities, a variety of experiences should be provided.

3. Application

Applying is one process experience which education for self-reliance emphasizes. Learning activities that require students to examine in a new setting ideas, application of mental processes, or current problems which have been previously studied should be emphasized. An activity that builds on previous student's work by directing a focus into novel locations, new subject matter areas, or different contexts is likely to be more appropriate than one that is completely unrelated to the previous work of the student. A continuous effort to apply what is known to explain something new will develop habits and learning sets in school that permit an individual to continue learning beyond school. It is in this sense that Dewey (1938) found that 'Every experience is a moving force' (p. 38).

Learning activities may be of two kinds (Taba, Durkin, Fraenkel and McNaughton, 1971, pp. 39-40). One kind represents intake of new information which is organized, interpreted, and expressed by means of concepts already acquired. The other kind is a learning activity which challenges the student with cognitive dissonances - an activity which does not fit the student's existing conceptual system. In other words, the former category consists of learning activities which represent the intake of new information and the relating or fitting of that information to existing (already acquired) concepts; this process is Piaget's "assimilation". The latter category consists of learning activities which require students to recognize or add a new dimension to what has been already learned, a process called by Piaget "accommodation". For instance, students who have reached conclusions based on their investigation of population growth in developing countries will, if they are faced with a markedly different set of conclusions from a new source of information, have to reorganize their viewpoints. This category of learning experiences is most likely to permit "non-specific" transfer.

For students to become transfer learners they need to exercise autonomy of thought and action. This requires that the activities provided must at least meet the following criteria:

(i) Students should be given opportunities to organize their own conceptual systems and to develop their skills for independent processing of information. Teachers should assign to students active rather than passive roles in the learning situation. Activities which channel student's energies into such roles as panel members, researchers, orators, observers, reporters, actors, surveyors, role players or participants in simulation exercises are more likely to promote student learning than ones which assign students to tasks such as mere listening to a drill session, or participating in a routine teacher-led discussion. Emphasis on student's autonomy of thought and action implies that appropriate activities are those which will engage learners in inquiry.

Some studies have concluded that the development of an autonomous and actively exploring person, of one who has the cognitive ability to shift from impulsive to reflective thinking, from field dependence to field independence as the problem-solving task demands, a person self-reliant in inquiry, requires a freedom from constraints. Such freedom of inquiry maximizes the need for cognitive shift and minimises the possibility of rigidity in problem solving behaviour, and consequent self-assured or self-confident behaviour. Analytical thinkers are more field independent and separate relevant from irrelevant cues (McCartin, 1970, p. 251).

(ii) Most learning activities provided must be open-ended. Activities that can be done successfully by students of diverse interests and intellectual backgrounds are more likely to develop divergent thinking or creativity than ones which specify in rigid terms only one successful outcome of the activity. Students should be given opportunities to deal with thinking assignments such as imagining, comparing, classifying, summarizing or evaluating, all of which allow students to operate on their own levels without imposing a single standard on the outcomes.

If a learning activity is open-ended, in the sense that it not only permits but also encourages responses and subtasks that differ in depth, in the content of the response, and in the way of thinking, the freedom and flexibility of the program will be realized. If activities are open-ended, they will most likely accommodate heterogeneity in prerequisite capabilities, interests and needs among students in a class.

(iii) As Raths (1971, p. 23) suggests, learning experiences should engage students in some degree of "risk" taking - not a risk of life or limb, but a risk of success or failure. Risk taking is the reality of life. Most of our decisions and actions involve a degree of risk or adventure because man has not been able to predict all the factors that influence his decisions and actions. Thus man works under conditions of probability. Students must practice the reality that life means both success and failure and that failure may result in success or in new adventures. This does not mean that teachers should provide activities that will fail students, but it means that activities that may receive criticism from others on the basis of "what is usually done", that may fail because of unforeseen events or conditions, are likely to be more worthwhile than activities that are relatively risk-free - using approaches which are condoned openly by the community and the school administration and which have served teachers and others well in the past.

(iv) Learning experiences must engage students in controversial issues. Students should examine topics or issues that citizens in our society do not normally examine or take for granted and that are typically sensitive and usually ignored by the major communication media in the nation. Such experiences are required to promote affective development which is 'much neglected in our schools' (Lema, 1973, p. 39).

One reason for neglecting affective experiences might have been that feelings and attitudes traditionally have been considered private matter not to be incorporated in the instructional programs or to be discussed openly. Thus, for instance, issues concerning certain religious beliefs and taboos, sex, discrimination and the like have usually been seen as "dirty" and irrelevant for geographic education. Another problem of affective development is the common attitude that each discipline promotes particular attitudes and values. To the extent this is true needs an extended investigation. The writer's estimation is that the development of attitudes and values cuts across arbitrary disciplinary boundaries. To believe that geography develops attitudes and values that might not be developed by sociology, physics or linguistics overlooks the totality of human learning experience. Indeed, even natural science programs might develop attitudes that could be developed by social studies programs. Human excellence and dignity, equality and respect of individuals, human rights, cooperative endeavour and the like can be developed by any program. The problem is how to do it. But regardless of the subject-matter content of a program, all educational programs are responsible for the development of student's positive attitudes and values, for these motivational factors can hardly be classified according to traditional disciplines.

Lack of opportunities for our learners to deal with controversial and sensitive issues is likely to incapacitate their learning. This observation is very well substantiated by educational research. It has, for instance, been found out that students who are prejudiced have the least tolerance for ambiguity; they resort to black-and-white situations, and arrive at premature closures to problems often at the neglect of reality. This stance of prejudice is clearly related to the inability to keep an open mind to new experiences, so to sustain cognitive inconsistencies, and so to arrive at higher levels of thinking. This behaviour can be observed even in cases with prejudiced adults from which the children copy it (McCartin, 1970, p. 248). Thus the personality of adult models may facilitate or hinder student's development of attitudes and values. Individuals who are negatively biased toward an argument cannot incorporate new material in their existing cognitive structure since that new material competes with existing meanings, is ambiguous, and as such is subject to rapid forgetting. Positive attitudinal bias, however, operates in an opposite manner, allowing the learner to incorporate and extend his cognitive structure (McCartin, 1970, p. 253).

If the student is to change his negative values, he must be able to critically examine his own attitudes and values, bring them out into open discussion, see how they compare with those of others, commit himself in public to the new values and then have an opportunity to practice evaluating himself. Unless parents and teachers provide positive reward for children's affective involvement, and supply models so that role-taking skills can be learned, the consequence will be an absence of abilities for understanding much of everyday human behaviour.

Since the importance of the peer group increases with age, attitude formation in older students is more effective when approached through group processes. This involves an emphasis upon discussion. This requires a classroom climate that will facilitate student-student interaction rather than one which maintains a "communications bottleneck", that is, a situation in which every bit of talk is channelled through the teacher (Charles, 1972, pp. 159-160).

Since attitudes are based upon emotions, change is dependent upon an appeal to feelings. The use of dramatic events, case studies, real world situations, and episodes in which the student is required to put himself in the position of another are effective ways of appealing to emotions. Students will more readily accept attitudinal change when they feel they have had the opportunity to decide for themselves. Therefore, students should be provided with realistic experiences and questions which they may discuss or investigate and make decisions. The need for students to make their own decisions is a key goal of education for self-reliance. Techniques and learning experiences should be designed to realize this goal. Several educators (Davidson, 1973; Gunn, 1970; Scarfe, 1971; Sanders, 1968; Boocock, and Schild, 1968) have suggested that decision making process might be effectively developed and encouraged through the use of educational simulations. Although the effectiveness of these simulations remains uncertain, we need to experiment them, for they seem to be very helpful inquiry techniques and effective tools for developing attitudes and values and for enabling students to learn by doing and by engaging in decision making, especially when real world situations cannot be reached.

(v) Provisions should be made to enable the learner to determine the adequacy of his responses shortly after he makes them. That is to say, students must be given practice in arriving at knowledge of results or feedback for themselves. A well-conducted feedback is motivating and can reinforce desired responses. Rather than having students perceive assignments as tests to complete, activities should provide time and opportunity for students to revise their themes in the light of criticism and available evidence. Activities that communicate to students that their efforts are approximations of reality or truth and that efforts can be made to improve their work are likely to be more appropriate than activities that merely suggest that once an assignment is completed the first time, it is finished.

(vi) Learning experiences must involve students in the investigation, testing and application of meaningful criteria or standards by which to evaluate their own efforts and those of others. Students need to learn how to base their judgments on sound criteria.

4. Student Involvement in Program Development and Instruction

As pointed out previously, learning activities must permit students' involvement in program development and instruction. We educators must admit that any program of instruction is not intended for us but for the learners. We just facilitate student learning. Students must be accorded the right to influence the content and process of the ongoing program. It is through such students' experiences that teaching-and-learning process will truly be a cooperative rather than competitive and divisive endeavour. For instance, students may be permitted to make informed choices in carrying out the activity and to reflect on the consequences of their choices and actions. An activity can thus require students to select topics for study, resources for use or media for displaying the ideas. They may be engaged in the production of instrumental content by using their environment. Rather than merely read a book for examinations they may be evaluated in terms of their review of that book or in terms of producing a similar book. Students should be invited to express their own interests and define problems in which they feel a personal involvement. Through such an effort, the program will better accommodate the needs, interests and capabilities of the learners. And this cannot be fully realized by centralizing the process of program development or by accepting the rationale of the academic rationalists or by using expository teaching strategies.

5. Cooperative Endeavour

Learning activities should provide students a chance to exercise a cooperative endeavour. Students should share the planning, the carrying out of plans and the evaluation of the results of their activities. Activities in which students work in groups should be encouraged. As Ndunguru (1973, p. 7) points out, the concepts of "cooperative endeavour" and "individual excellence" in the philosophy of education for self-reliance should not be thought contradictory; both concepts are equally important for the individual and for the society as a whole.

To stress cooperative endeavour is to recognize 'that we are all members of the one society, depending upon each other' (Nyerere, 1968, p. 283). It is a recognition that there are certain tasks which can be done more economically, more efficiently and can yield better and greater results when our resources are pulled together in performing those tasks. Moreover, to encourage cooperation is to encourage the development of an attitude which is compatible with social living of the family unit and of the community.

Along with cooperation, however, individual excellence should not be overlooked. It should be encouraged, for it is through the quality of actions of the individuals who will form a particular group that will determine the nature of that group. Students should thus be given opportunities to both learn individually and in groups. Individual excellence is itself not undesirable, but it is the purpose for which it might be used that is important. In our case, individual excellence should excel the community; it should be used to contribute to the common good of the society, to extend the limits of humanity, to personalize man, and, hence, to ensure the existence and development of the individual himself and the society as a whole.

6. Use of the Real Environment and Primary Materials

Learning experiences should engage students in the use of real world (extended) environment. Learners must themselves transform the real environment into the decision (display) environment. The rationale of the academic rationalists that learning has to only use funded knowledge should in our case be regarded as an obsolete and irrelevant philosophy. As Raths (1971, p. 23) suggests, a worthwhile activity is one which should involve students with realia. Activities which encourage students to touch, handle, apply, manipulate, examine and collect real objects, materials and artifacts either in the classroom or on field trips should be more emphasized than those which merely use books, pictures, models or narrative accounts.

To involve students with realia also means that activities should engage them in social action rather than studying geography for geography's sake. Students must confront the real behaviour and problems of man and take an active part in solving these problems through "direct learning". Such direct experiences must be part of our educational philosophy if students have to really feel and discover what we are like and to perceive the need and meaning of action for development and to want to act towards that end themselves. More will shortly be said about social action in relation to school-community integration.

The above list is by no means complete and not all of these criteria can be used to select a single activity. But these criteria, like those suggested for selecting and organizing instructional content, illustrate the need for us to select and organize program components on the basis of multiple criteria, and to have a rationale for a choice of program priorities.

III. A MODEL OF INQUIRY TEACHING AND INQUIRY LEARNING

The Concept of Inquiry

The concept of inquiry has been discussed by several educators[3] but Beyer (1971) has contributed a more comprehensive attempt to clarify this concept. Although the foregoing discussion draws from other sources, it bases heavily on Beyer's work.

As Beyer describes it, inquiry is one way of knowing; it is a quest for meaning that requires one to perform certain mental operations in order to make experience understandable. It is one way of making sense out of what we experience.

Figure 26 illustrates a structure of the concept of inquiry. The key components in this structure include a process, a set of attitudes and values and certain kinds of knowledge.

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[3] See, for example, Dewey (1933); Crabtree (1966); Kellum (1969); Gross, Meussing and Fersh (1960); Bruner (1956; 1962; 1963); Kersh and Wittrock (1962); Suchman (1964); Fenton (1967); Burns and Brooks (1970); Eisner and Vallance (1974); Ausubel (1961; 1968); Metcalf (1963); Freire (1970).

1. Knowledge

An inquirer must know about the nature of knowledge and about the tools of inquiry. Certainly, knowledge is constantly changing and therefore quite tentative. What passes for knowledge is nothing more than interpretation. What we accept as true today is only tentative and therefore subject to change in the light of future information and investigation. Knowledge is also fragmentary or incomplete in the sense that we cannot secure absolutely all pertinent information necessary for making a judgment that will stand forever. This is due partly to the difficulties of locating and collecting all relevant information and also to the fact that since knowledge is a product of the human mind, it is subject to all the peculiarities of that mind at work.

The accuracy of what is known, the degree to which it corresponds with reality, is determined by the quality and quantity of the relevant evidence and by the way in which it is manipulated. Thus the closest approximation to the way things really are or were can only come through honest and sustained inquiry.

In order to inquire productively, one must also understand the nature and function of the tools of inquiry. These tools include sources of information, basic concepts which can help analyze experience and a process of inquiry itself. As previously established, sources of information (real and decision environments) need to be reliable, authentic and particularly conveying primary information.

A concept is a mental image of something. The "something" may be anything - a concrete object, a type of behaviour, an abstract idea, a place, or an event. The image has two basic dimensions: the individual components of the concept as well as the relationships of these components to each other and to the whole (Beyer and Penna, 1971; Beyer, 1971, p. 111). Significant concepts group their subject matter so that they can enter into many true and important propositions (Kaplan, 1964, p. 50). Concepts serve 'to identify the entities we think about, classify the entities into related sets, relate entities in time and place, define attributes, and perform all of the other functions implied in the term "organization of experience"' (Meehan, 1968, p. 35). Concepts give rise to questions which may be asked for experience or data to make it meaningful; they serve to organize disparate information into categories and patterns which reveal meaningful relationships; and they help to produce knowledge.

2. Attitudes and Values

For one to be a successful inquirer he must possess at least the following attitudes and values towards inquiry:

(i) Skepticism. It is a kind of questioning attitude that doubts simplistic answers or single-factor causes and solutions. Skepticism is generally reflected in a reluctance to accept

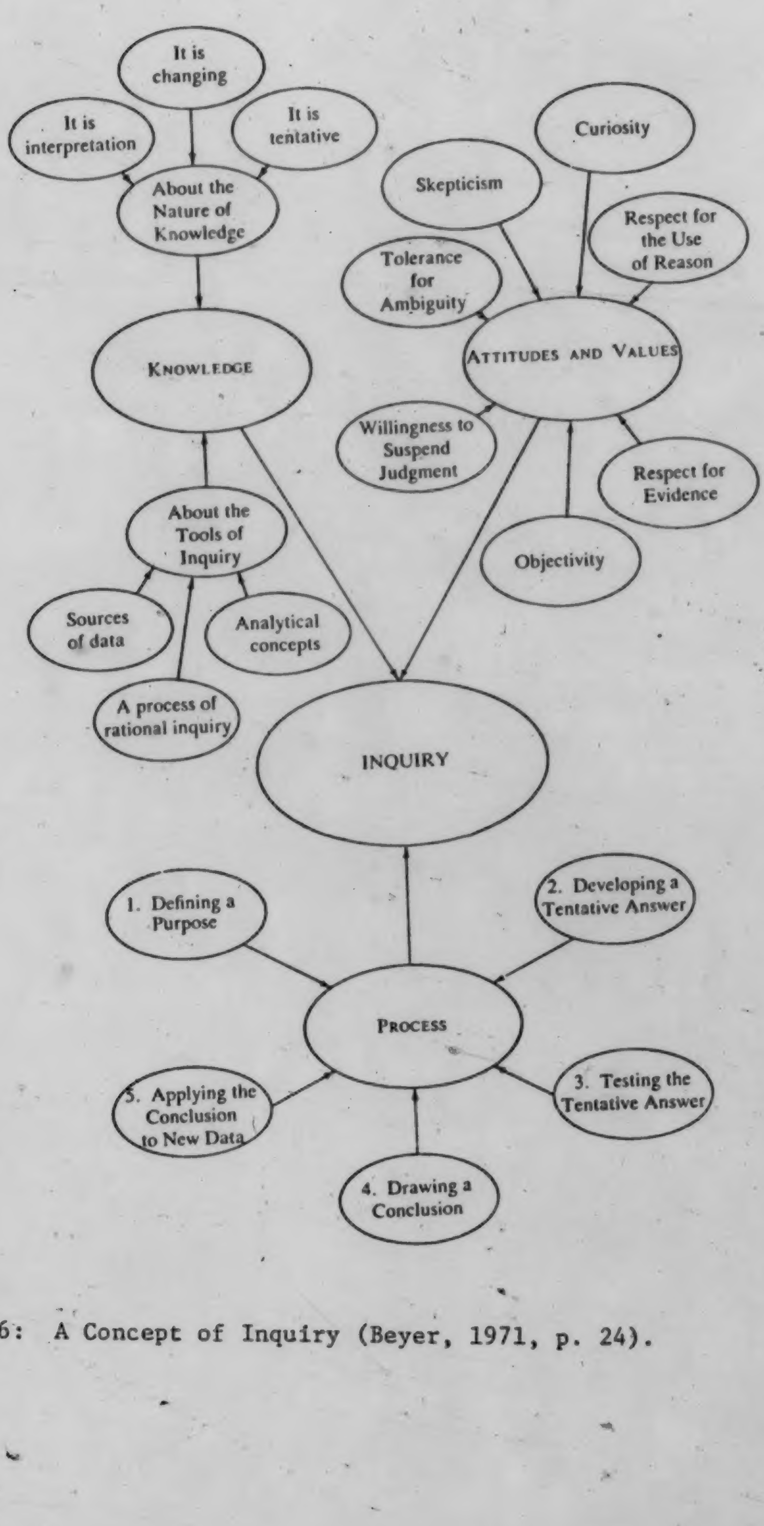
It is changing
It is interpretation
It is tentative
About the Nature of Knowledge
Curiosity
Skepticism
Respect for the Use of Reason
Tolerance for Ambiguity
KNOWLEDGE
ATTITUDES AND VALUES
Willingness to Suspend Judgment
Respect for Evidence
About the Tools of Inquiry
Objectivity
Sources of data
Analytical concepts
A process of rational inquiry
INQUIRY
1. Defining a Purpose
2. Developing a Tentative Answer
PROCESS
5. Applying the Conclusion to New Data
3. Testing the Tentative Answer
4. Drawing a Conclusion

FIGURE 26: A Concept of Inquiry (Beyer, 1971, p. 24).

obsolete interpretations or the assertions of so-called authorities as the final truth, and, conversely, in a desire to find out for oneself. It both helps generate inquiry as well as stimulate and guide it.

(ii) Curiosity. Skepticism implies curiosity, for even though one doubts something, inquiry will not take place unless he is curious enough to want to know more or better about it. Curiosity is an attitude of wanting to know. Curiosity increases sensory input since the curious person seeks opportunities for stimulus novelty which lead to an active relationship with the environment (McCartin, 1970, p. 248).

(iii) Respect for the Use of Reason. One is likely to be an inquirer if he values the use of rational investigation as the best way to learn, that is, if he finds out the solutions to problems on his own by inquiry. Although his investigation will involve consulting reliable sources of specific information estbalished by others, he will use such sources to find out the approximations to truth for himself rather than memorize or use them unthinkingly.

(iv) Respect for Evidence as a Test for Accuracy. There are many tests for truth. One of the essential tests to inquiry is the quality and quantity of the evidence relative to the question, problem, or task at hand. An inquirer should value the evidence as a determinant of the accuracy of opinions or hypotheses rather than merely base his judgment on the assertions of others.

(v) Objectivity. Because an inquirer knows that what people report as true is really only a perception of what they think is true, because people perceive things differently due to their own special conceptual frameworks, he knows that there are several sides to every question. Consequently, he realizes the need to search out and examine all possibilities in a way as dispassionate and unbiased as possible; he deliberately searches for evidence contrary to what he expects or wants to find; he evaluates it fairly rather than hastily dismisses it as worthless. He must be aware of his own biases and prejudices and should strive to avoid allowing them to distort the data with which he works or the ways in which he works with it.

(vi) Willingness to Suspend Judgment. This involves the realization that it takes time to locate sufficient evidence to prove a point beyond a reasonable doubt. Although one cannot wait to make a decision or judgment until all the evidence has been accumulated, one must still hesitate to jump to final conclusions before sufficient data has been examined.

(vii) Tolerance for Ambiguity[4]. People tend to have varying degrees of both tolerance for certainty and for uncertainty. This tolerance and intolerance for ambiguity plays a key role in inquiry.

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[4] See McCartin (1970, pp. 245-255).

The degree to which one can tolerate uncertainty may be viewed as a continuum running from a high degree of tolerance on one end to almost complete intolerance at the other. At a point along this continuum, however, a point which varies according to the individual, an end to ambiguity is sought. It is a point at which people want certainty or an answer and they will more actively seek it. A growing intolerance for any more ambiguity will intrinsically motivate them to seek a solution to tie up loose ends, to draw some degree of certainty out of uncertainty. It is this pursuit that leads to learning and sustains inquiry - the learner's deep-seated desire for an answer, not to satisfy the teacher or to pass examinations but to satisfy himself. Final or terminal examinations might have hindered such satisfactions.

Yet there is another point on this continuum beyond which inquiry is inhibited. At this point one can no longer tolerate any more ambiguity, and his frustration turns him away from the effort of learning or inquiring. He divorces himself completely from the learning situation.

Understanding this important attitude toward ambiguity is basic to inquiry because inquiry is actually built on the natural human desire to close the gap between uncertainty and certainty, between what is and what should be, that is, to solve a problem. There must be some degree of ambiguity or inquiry does not occur. Yet, there cannot be too much ambiguity or people will just turn away from inquiry. A willingness to tolerate uncertainty to a point is useful in motivating inquiry and in dealing with the lack of essential data.

A Process

Inquiry also requires one to work with data or experience in a way often described as inquiry process. The process of inquiry grows out of and is sustained and guided by attitudes, values and knowledges. The three components of inquiry co-exist and are thus interdependent. The process of inquiry, however, is intellectual in nature, for it essentially consists of cognitive operations. It is not a single act but rather a complicated series of related acts, each of which consists of a number of unique intellectual operations which Burns and Brooks (1970) describe as "transformational entities". Thus a process of inquiry is a "process of processes" in which "low-level" processes are subsumed within "high-level" processes.

Figure 27 illustrates the essential steps of the inquiry process. The process requires an individual first to define a purpose for inquiry (or to define a problem) and then to guess at a tentative answer or solution, that is, to hypothesize. Thereafter, he must test his hypothesis against relevant data, must draw a conclusion about the validity of his hypothesis, and finally he ought to apply his conclusion to new situations.

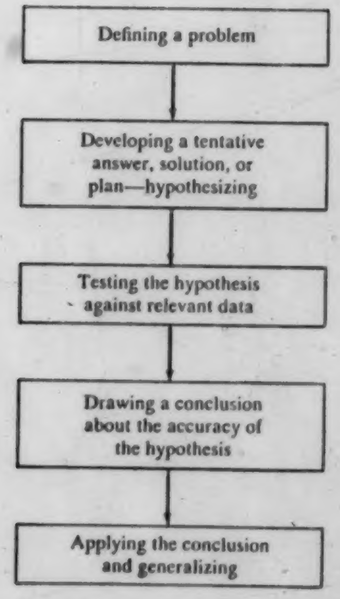
Defining a problem
Developing a tentative answer, solution, or plan—hypothesizing
Testing the hypothesis against relevant data
Drawing a conclusion about the accuracy of the hypothesis
Applying the conclusion and generalizing

FIGURE 27: A Model of Basic Steps of Inquiry (Beyer, 1971, p. 35).

This process does not proceed uni-linearly from problem to conclusion and application, but instead, its operations double back on each other, occur simultaneously and sometimes some are even omitted. Figure 31 indicates that although the model of basic steps of inquiry is simple, there is much more to each of these steps. Although Beyer's model of the process of inquiry is here used, it is difficult, as Burns and Brooks (1970) point out, to be sure that a list of processes is complete and that each process identified is "pure" (without overlap with another process). Much further research is needed to compile a comprehensive, valid, and clearly defined list of processes. Each operation of inquiry process will be observed shortly under the discussion on inquiry teaching and inquiry learning. We need first to establish some premises of the concept of "teaching strategy".

Teaching Strategies

The primary purpose of teaching is to facilitate student learning. Teachers have to stimulate student learning, guide it, direct it, make it easier, and in general ensure that it occurs. The way we teach is related to the kind of learning which students employ and the kind of knowledge they develop. Conversely, whatever kind of learning is used and whatever kind of knowledge is sought prescribe the kind of teaching that ought to be used.

There are many techniques that can be employed to facilitate student learning: questioning, reading, discussing, copying, role playing, simulating, gaming, drilling, lecturing, reporting, making a field trip, writing an essay and the like. The list of instructional techniques is practically endless. Each teaching technique has its own special assets and liabilities. Each may serve a variety of purposes, but none can serve all purposes nor accomplish the job alone. Some teaching techniques are better suited than others for facilitating a certain type of learning. Oral drill, for example, is best suited for teaching memorization.

Since these techniques cannot be used independently of each other, they must be carefully arranged in sequence so as to help the student achieve a learning objective as efficiently and effectively as possible. Thus one major task of teaching is to select, arrange, and apply instructional techniques so as to accomplish certain instructional objectives. These arrangements of techniques are what we call teaching strategies. In other words, a teaching strategy is a set of teaching techniques arranged to facilitate learner's attainment of certain instructional objectives (Beyer, 1971, p. 10; 54).

There are in reality many different ways to arrange teaching techniques in order to facilitate student learning. Some of these arrangements or strategies are expository, that is, are essentially "telling" and "banking", while others are primarily inquiry, that is, are "finding-out-for-yourself" or "discover". These strategies may be represented as the extremes of a continuum (Figure 28) on which can be placed any type of strategy devised for instructional purposes.

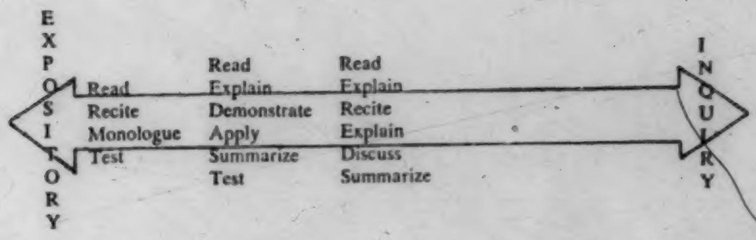
EXPOSITORY
Read
Recite
Monologue
Test
Read
Explain
Demonstrate
Apply
Summarize
Test
Read
Explain
Recite
Explain
Discuss
Summarize
INQUIRY

FIGURE 28: Expository-Inquiry Continuum of Strategies (Beyer, 1971, p. 13; 10).

1. Expository Strategies

Despite the presence of some student oriented techniques in each of the three strategies depicted in Figure 28, all are essentially "telling" strategies; they are near the expository end of the continuum. None of them require much more than listing, reading, copying and memorizing.

In expository (authoritative) strategies, decisions concerning the mode and pace and style of exposition are mainly determined by the teacher as an expositor or banker. The student is the listener and follower and the teacher deposits facts and figures in the student's mental "box". Here, the teacher has quite a different set of objectives and decisions to make than the passive listener. The teacher has a wide choice of alternatives for structuring teaching and learning. He is anticipating paragraph content, while the student is intent on the words. The teacher is manipulating the content of the material by various transformations, while the student is quite unaware of these internal transformations. The student is almost or entirely unconscious of how the teacher arrives at his conclusions. The learner usually writes it all down in notes, and tries to go over the teacher's points and "truths" later, in the hope of arriving at the same conclusions. If he cannot, then he can only resort to learning the work by rote. The student can only give back what is expected of him without finding any interrelationships with other experiences. The final or terminal examination further demands him to recite exactly that which he was fed. The "bright" sutdent is then judged on the ability to cram and recite.

Under such circumstances, however, the student's knowledge is certainly not his own, because he did not, and probably could not discover it. It may not even be the teacher's, for often such a teacher is unsure of how he himself reached a particular place in the argument. Usually teachers who teach through expository strategies were themselves taught in this fashion at school, college and university. And this is how the "poor student-poor teacher-poor student" cycle is perpetuated. Such teachers are authoritative and domineering. They hardly allow learners to exercise freedom of inquiry; they are themselves stereotyped. The extreme type of expository or rote learning is depicted in Figure 29.

The relationship between teacher and student typical of expository teaching is thus described by Freire (1970): 'A careful analysis of the teacher-student relationship at any level, inside or outside the school, reveals its fundamentary narrative character. This relationship involves a narrating subject (the teacher) and patient, listening objects (the students). The contents, whether values or empirical dimensions of reality, tend in the process of being narrated to become lifeless and petrified. Education is suffering from narration sickeness' (p. 57). This is the banking concept in which the relationship between the teacher and the student almost equates with that between the master and the slave, and is "secondary" rather than "primary". Education for self-reliance rejects emphasis on expository teaching and its superficial relationship between the teacher and the student when it is stated that there must be the same relationship between pupils and teachers within the school community as there is between children and parents in the village. The school is not a place for detaching humans and alienating them.

To achieve human relationship called for in the philosophy of education for self-reliance, the teacher should not be the kind of person who simply passes information from some textbook and other forms of display. We need teachers who can think out new things, who can improvise, who are willing to learn alongside the student,

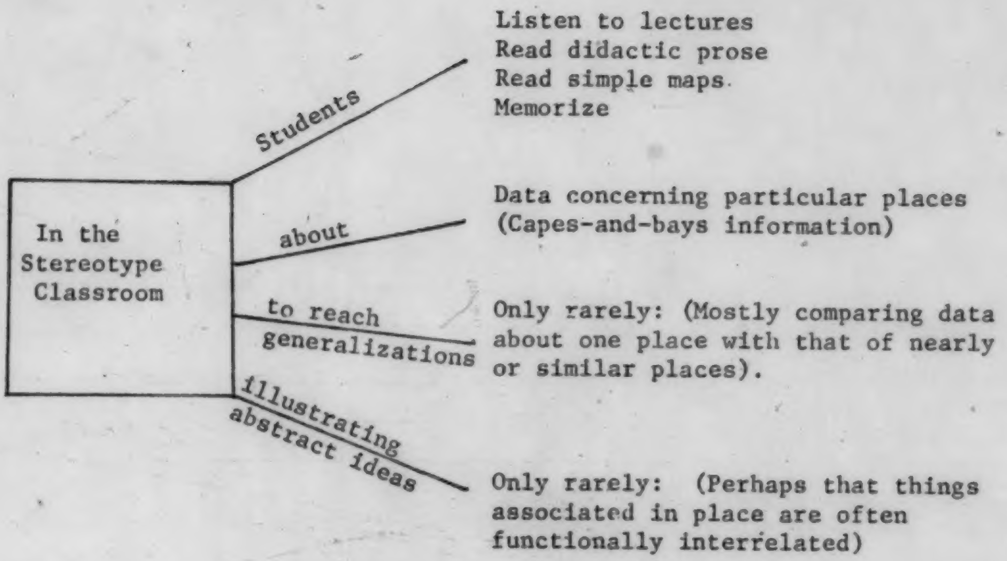
In the Stereotype Classroom
Students
Listen to lectures
Read didactic prose
Read simple maps
Memorize
about
Data concerning particular places (Capes-and-bays information)
to reach generalizations
Only rarely: (Mostly comparing data about one place with that of nearly or similar places).
illustrating abstract ideas
Only rarely: (Perhaps that things associated in place are often functionally interrelated)

FIGURE 29: A Model of Extreme Type of Expository Learning Experience (Helburn, 1968, p. 279).

and to learn from the mass media and directly from the masses. We need teachers who are to learn from anything, to improve, to be a performer, to be the kind of persons who teach by practical examples and who are not "wanyampara".[5] Such a person has got to be a sympathetic and inquiring teacher who can look at our young people and recognize their diverse talents, build up their confidence and their abilities to find enjoyment and usefulness in what might seem to adults to be simple or useless things. Indeed, this is the essence of the above statement so often quoted from the "Education for Self-Reliance". It does not mean that we teachers should duplicate the traditional chains of "obedience" and adult domination of children into the learning situations within the school community. Instead, it calls for a teaching and learning climate conducive to developing inquiring minds. "Wanyampara" attitudes have to be abandoned, for they are extremely antithetical to freedom of inquiry. And this freedom is the function of inquiry teaching and inquiry learning. We need to be clear on what these two concepts mean.

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[5] "Wanyampara" is a Swahili word meaning "masters of slaves".

2. Inquiry Teaching Strategy and Inquiry Learning.

Inquiry teaching, unlike inquiry learning and inquiry itself, is teaching by using inquiry. Inquiry teaching involves creating and conducting learning experiences which require students to engage in inquiry. An effective strategy of inquiry teaching is thus built directly on inquiry itself. Such teaching is process oriented rather than information oriented. It is conceptual instead of factual in emphasis. Information and facts are in this case tools of inquiry. Inquiry teaching can in fact be seen as a system of beginning with the question instead of assuming the sacrosanctity of the answer (Kellum, 1969, p. 101). This is very important because in expository teaching teachers begin with providing students with ready-made answers to memorize and only to be regurgitated during the mid-term or final examinations; the question comes last - at the end of instruction. In inquiry teaching, the question has to be built in every stage of inquiry process; it is employed throughout the process.

Inquiry teaching requires cooperation between the teacher and the student. This cooperation should be characterized by intersubjective, transactive interdependence of teacher on learner and learner on teacher and of learner on learner and teacher on teacher, and of these humans on the rest of the members of the community (Aoki, 1974, p. 94).

The learner does not function in the passive mode but takes an active part thoughout the teaching-and-learning process. He does not condition himself to submit to authority or to accept the proffered gospel, but selects his conclusions and assesses their validity. Even in expository teaching the student employs a number of processes, but they are directed toward the sponging up of bookishness and to its consequent exhibition in the preferred manner (Parker and Rubin, 1968, p. 131).

Unlike expository teaching which emphasizes information as an end in itself, inquiry teaching requires the learners to use any relevant information to develop broader, more meaningful knowledge, skills, values and attitudes. Inquiry teaching enables students to become constructionists, that is, ones who organize what they are encountering in order to discover relationships and regularities and who isolate useless or irrelevant information, assumptions and questions.

Inquiry teaching is performed in the service of inquiry learning. Inquiry learning is essentially a way in which the learner finds out for himself by experiencing inquiry. There is no inquiry learning if a student has not undergone inquiry itself. Figure 30 depicts a simple model of the learner's inquiry experience.

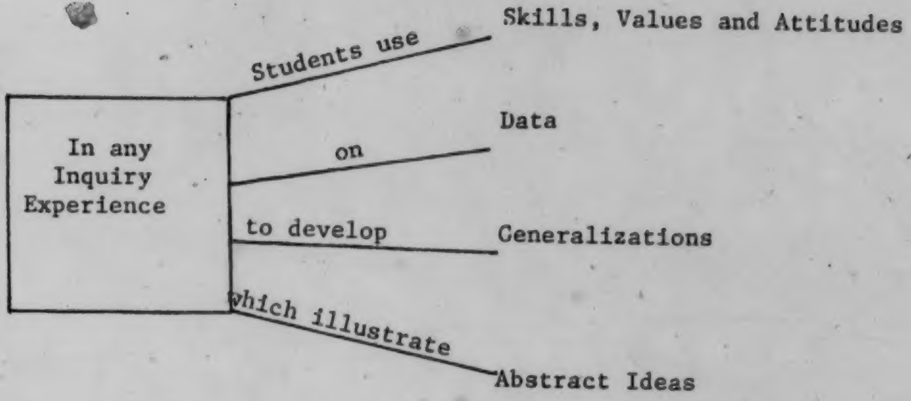
In any Inquiry Experience
Students use
Skills, Values and Attitudes
on
Data
to develop
Generalizations
which illustrate
Abstract Ideas

FIGURE 30: A Simple Model of Inquiry Learning Experiences (Helburn, 1968, p. 278).

Although inquiry teaching is learner centered, it requires considerable teacher involvement. The teacher must plan or design a learning experience that will engage a student in inquiry. This includes creating a series of activities designed to put students through the various stages of inquiry as well as collecting or preparing appropriate instructional materials and guides. It also requires the teacher to direct or guide the learning experience by asking questions, making comments or suggestions, and providing data when it is needed.

Inquiry teaching requires that instructional content be carefully selected and organized. Since this content is used in depth for a relatively long duration, detailed coverage of many large areas of content is impossible and indeed undesirable. But detailed study of a few themes in depth illustrating various problems is the goal. Thus, using inquiry teaching means that coverage of areas country by country and continent by continent and many topics must be eliminated in favour of depth study of a few topics, and that a considerable amount of content which is listed in the syllabus must be replaced with new content which is process and value oriented rather than information oriented. In fact if we are to maintain a national syllabus at all, it should consist of a continuously revised list of broad problems suggested cooperatively by teachers, students and others rather than a list of topics to be covered. If we are to emphasize process and affective learning rather than information learning, the idea of a syllabus as it exists today needs a serious reconsideration.

A Process of Inquiry Teaching and Inquiry Learning

1. Defining the Problem (or Purpose for Inquiry)

Inquiry commences when one feels a need to know something. This "something" may be an answer to a question or problem, a bit of information needed to satisfy a curiosity or some information that is sought to bring closure to an otherwise unsettled experience. This stage thus involves problem recognition and is marked by behaviours that are goal-oriented. Developing a reason for inquiry requires one to observe the elements that relate to the phenomenon or phenomena involved in the problem being identified.

The purpose of this phase of inquiry teaching is to stimulate students to raise questions, to identify problems that bother them. Before students can go about solving a problem effectively, the problem itself must be quite explicit and genuine to students. It should be made meaningful and manageable. The major task is here for the teacher to guide the students to become aware of the problem, to make it theirs and help them to state it as simply and directly as possible. The best learning requires student-perceived and articulated purposes. This stage, therefore, involves facilitating, not obviating, the development of such purposes.

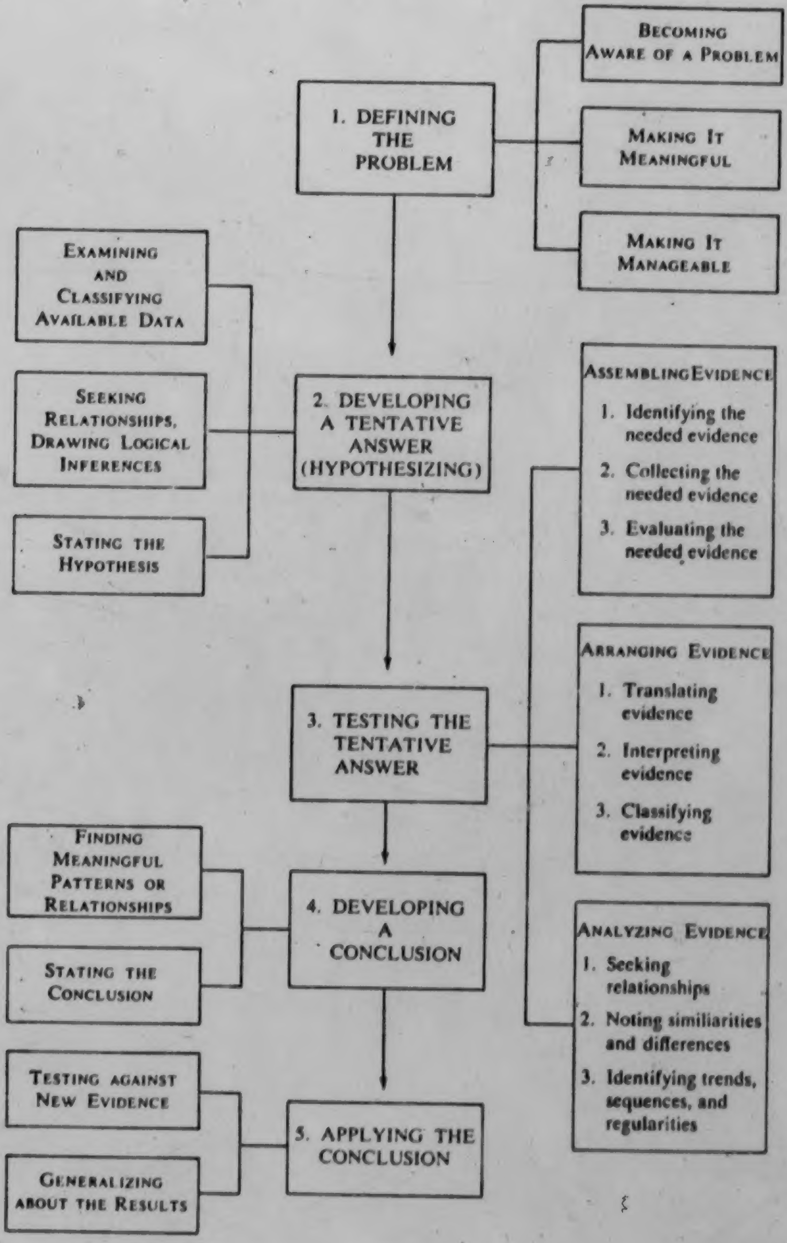
BECOMING AWARE OF A PROBLEM
1. DEFINING THE PROBLEM
MAKING IT MEANINGFUL
MAKING IT MANAGEABLE
EXAMINING AND CLASSIFYING AVAILABLE DATA
SEEKING RELATIONSHIPS, DRAWING LOGICAL INFERENCES
2. DEVELOPING A TENTATIVE ANSWER (HYPOTHESIZING)
STATING THE HYPOTHESIS
ASSEMBLING EVIDENCE
1. Identifying the needed evidence
2. Collecting the needed evidence
3. Evaluating the needed evidence
3. TESTING THE TENTATIVE ANSWER
ARRANGING EVIDENCE
1. Translating evidence
2. Interpreting evidence
3. Classifying evidence
FINDING MEANINGFUL PATTERNS OR RELATIONSHIPS
4. DEVELOPING A CONCLUSION
STATING THE CONCLUSION
ANALYZING EVIDENCE
1. Seeking relationships
2. Noting similiarities and differences
3. Identifying trends, sequences, and regularities
TESTING AGAINST NEW EVIDENCE
5. APPLYING THE CONCLUSION
GENERALIZING ABOUT THE RESULTS

FIGURE 31: A Model of the Process of Inquiry (Beyer, 1971, p. 50).

2. Developing a Tentative Answer - Hypothesizing

Having defined and stated in manageable terms the problem to be investigated, inquiry process proceeds to the next step of suggesting alternative solutions or formulating tentative answers, that is, hypothesizing. To hypothesize is to guess to an answer using available and relevant data. One problem with expository teaching is that students are asked to cram lots of untested hypotheses rather than being given an opportunity to hypothesize and test their own hypotheses.

Hypothesizing is an inductive as well as a deductive process. It is also intuitive. It involves inductive thinking in that one works with separate, often disparate, bits of information and comes up with (infers) a general statement which apparently explains the proper relationship between all that information and any additional, but as yet unavailable, relevant data. Induction means proceeding from numerous particular instances to general statements. Deduction means using one or more principles or generalizations as the basis for drawing a logical yet tentative answer or conclusion about the matters we would like to learn the truth about. Deduction is not a type of thinking unique to so-called "scientific method" or to natural sciences but a man's natural way of thinking. It is misleading to regard deduction and induction as mutually exclusive or "repelling" forms of inferences. Both types of reasoning are not necessarily antagonistic processes. They actually complement each other (Harvey, 1969, p. 40; Thomas and Brubaker, 1971, p. 248).

However, one major educational problem has been to get learners to cram and recite someone else's products of his deductive reasoning. Here, the problem has been to admit to and learn what others think is ture, their answers or conclusions, rather than treating them as data, the validity of which must be tested by learners themselves, be these data called theories or laws.

Data is an important ingredient in the hypothesizing experience. Such data may come from any source, student's prior experiences included. The teacher might guide a hypothesizing experience in various ways, but it is essential that once the students have grasped the process, teacher's control should be very minimal or completely eliminated. It is neither necessary nor desirable for the teacher to strictly direct all hypothesizing activities. The immediate task at this point is to teach students the necessity of hypothesizing, of stating a hypothesis and using it. Hypothesizing ought to be an open-ended or creative endeavour, postulating connections between the initiatory problem and some already known data. Thus students should be given freedom to use their imagination to engage in divergent thinking, and to even be free to be irrational. Predetermined or imposed arrangements are antithetical to this kind of experience. The teacher may aid student's hypothesizing experience by providing useful data and through questioning techniques but he should as far as possible allow them an opportunity to hypothesize on their own.

3. Testing the Tentative Answer

After a hypothesis or tentative answer has been developed, it must be tested to see how well it is supported by the relevant information. Unless a hypothesis is deliberately tested against as much relevant information as one can secure in the time available and is substantiated by this test, it cannot be considered a definitive answer.

It is essentially at this stage of hypothesis testing that new learning takes place, for it is through it that we come into contact with new information - dissecting it, rearranging it, and pulling it apart over and over again. It is here that our accumulated knowledge, creativity or originality, imagination, insight and prior experiences are brought to bear on new experiences in order to develop new meanings. This process leads one to familiarity with the information itself and to the development of conceptual knowledge. Hypothesis testing involves three general steps of assembling, arranging and analyzing evidence.

Arranging evidence will essentially involve three distinct operations: translating[6], interpreting, and classifying. Translating involves putting information in a form easily understood by the student. This frequently necessitates translating a piece of evidence into more familiar terms. Translating may involve putting one piece of evidence from one language to another (English to Swahili) or simplifying a highly technical piece of writing or vocabulary (plateau being described as a tableland) or transforming one form of evidence into another (statistical data into a graph or miles into kilometers). Translating evidence is important to preparing it for analysis because by so doing, recognition of new relationships may be made easier.

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[6] See Burns and Brooks (1970) for further discussion on "translating".

Translating, however, is not the same as interpreting. Translating involves essentially displaying information originally presented in one form in another form. A photograph showing a sisal plantation is translated when it is described in essay form or when it is transformed into a drawing or plan. But such transformations are not interpretation unless we discover that this picture represents a sisal plantation of a particular place and at a particular time. Thus, interpreting is a skill which involves making connections between what we see and what we already know, our own unique frames of reference and store of knowledge. It involves recasting or summarizing our perceptions in terms which describe or explain the interrelationships among them. Here, we find out the meaning of the phenomenon whatever the form into which it is translated. Thus, interpreting the picture of a sisal plantation sums up its contents by giving the meaning of that picture.

Interpretation of a certain funded phenomenon is facilitated if that phenomenon is observed in various types and forms of display. This suggests the need for evidence to often be transformed into several different forms if they have to really facilitate student learning. Often (and the syllabus so specifies) students are only engaged in interpreting maps, statistical and graphic data and photographs. But interpretation should extend beyond these types and forms of display to include even written and verbal evidence not only from an area in East Africa, but according to the problem being investigated or a hypothesis being tested. As previously illustrated, while students may for example be investigating agricultural problems of East Africa, they may at the same time deal with relevant data on the Canadian Prairies or on the Kibutz of Israel or on whatever place is relevant to the investigation at hand. Every effort must be made to help students recognize when they are or should be translating and when they are or should be interpreting because it is essential to avoid the confusion that will surely result should these steps be unconsciously interchanged.

The preparation of evidence for analysis requires the inquirer to arrange that evidence in categories or classes. Classifying is especially important when dealing with large masses of information. Categorizing individual pieces of information according to some criteria facilitates the handling of considerable amounts of data and also makes possible the detection of a wide-variety of interrelationships, trends, and sequences, which otherwise might go unnoticed.

Students should be taught and encouraged to categorize the same data in a variety of ways. Data may be classified according to many criteria. Some of these might include classifying data according to temporal dimension - by centuries, by sequences of change, by cause-effect relationships, and within these by immediate and long-range changes. Students may also group data according to spatial dimension - by relative position, by distance (earth, economic and psychological), and by association with other features. They may also categorize data in terms of some factors which affect human life, such as economic, political and social. Students may and should categorize data according to the categories and procedures used by a professional librarian.

Arranging data by ranking often involves personal opinions or preferences. Ranking certain events or features according to how good or useful or right they may be for a certain person or group helps the student to clarify his own values and attitudes, for the way in which the items are ranked may provide a good clue as to what he values or does not value.

Teachers must help students learn to classify data in a variety of ways. This should even entail teaching students the skills of a typical librarian. School and community librarians will often be willing to help in teaching students and teachers such skills. Indeed, librarianship should be a compulsory and regular subject in our primary and secondary schools and in our Teacher Colleges and University, especially for students who intend to become teachers. This is important because it is partly through our young people mastering and using library skills that they will become efficient inquirers. In fact we need at least one teacher trained to teach library skills in every primary and secondary school. With the need to introduce community libraries, these skills should also be emphasized in adult education programs which should also be process and affective oriented rather than information oriented.

Analysis may be used to refer specifically to those mental operations involved in pulling evidence apart and refitting it in the search for new meaning. It does not refer to assembling or arranging evidence, but it does include the intellectual manipulation of data to identify similarities and differences, trends and sequences, regularities and patterns of significance. For analysis to be performed properly data must be assembled and carefully arranged or displayed.

Analyzing evidence basically involves making inferences. Inferring is positing connections between the evidence and the hypothesis and among all the pieces of the evidence (Beyer, 1971, p. 79). What one looks for in analyzing any specific body of evidence depends on the nature of the evidence and the hypothesis under consideration.

In general an inquirer ought to seek out items that repeat themselves, trends, sequences, patterns, regularity and other kinds of relationships of significance. Knowing what to look for can be most helpful in suggesting where to look and how to go about it. Analyzing is made easier by careful but imaginative assembling and displaying of the evidence. But drawing inferences from evidence, that is, analyzing, occurs in the minds of students. And as Beyer (1971) emphasizes, finding meaning in data is the essence of learning, and analysis is where it occurs. Analyzing experience should be a student's experience.

4. Developing a Conclusion

Concluding consists primarily of refitting the evidence in such a way that it takes on meaning relevant to the hypothesis being tested. This combining of parts into a whole is often referred to as synthesizing. It involves the same kind of mental operations used in formulating a hypothesis. The difference is that a hypothesis represents only a possible expalnation because it is based on only fragmentary evidence and often developed without any deliberate analysis of an almost conclusive amount of evidence.

A conclusion is usually a statement about the validity of the original hypothesis. It is really a judgment about the rightness or wrongness of the hypothesis. It may be merely a reaffirmation of this guess, but more often than not, it is an elaboration with certain qualifications or even substantial modifications. Regardless of which form a conclusion takes, however, and because it is built on specific but often limited evidence, it is rather restricted in scope or applicability. Conclusions that result from this state of inquiry must still be subject to considerable qualifications and modification as new data are later brought to bear on them.

Invalid hypothesis does also play a positive role in learning. An invalid hypothesis is informative in that a learner discovers, after invalidating it, that the evidence does not support it. A hypothesis that has not been substantiated indicates a line of probing that need not be pursued further and thus eliminates a whole collection of data that need not be looked into any deeper. An invalid hypothesis might be gratifying, for it may come with payoffs - it may lead to new hunches, new problems, and to a fresh desire to continue an inquiry in a new direction. It is in this sense that an "error" or "wrong answer" can be said to be informative. Students should be positively rewarded rather than "punished" for arriving at invalid hypotheses.

In guiding the development of conclusions, the teacher must direct students into the learning experiences that require them to combine identified relationships among the evidence and between the evidence and hypothesis into statements that bear on the initial problem. Students must be asked to state explicitly the relationship between this rearranged evidence and the hypothesis being investigated. If the results invalidate the hypothesis, the student must return to the original question, develop a new hypothesis, and proceed again to test it. This repetition is, in fact, the way in which most problems are solved. It is in this sense a new experience builds on a prior undergoing experience and the connection between the two experiences results in new and meaningful learning. By repeated hypothesizing and testing, progress is made towards a valid conclusion and each repetition represents an insightful shift to a better conception of reality. This means that inquiry experiences must base on the principle of developmental learning.

5. Applying the Conclusion

A conclusion may be considered tentative until there arises an opportunity for an inquirer to check it against but related experience or data. Checking a conclusion against what others say and do is in fact a very common way of validating the outcome of an inquiry process.

The application of the conclusion to new data brings to an inquirer psychological as well as substantive closure to an otherwise still unsettled situation. It permits him to find out if his own independent inquiry is indeed substantiated by other sources. It frequently expands the original conclusion and may make that conclusion less specific, more applicable to and explanative of the class of data to which it is related without being tied to any specific set of that data. Thus the conclusion becomes more general, more conceptual.

Viewed as a product of inquiry, a generalization is a statement of recurrent relationship between several concepts; it is a statement which has no specific referent in time and place, that is, it is a statement which is generally true for the entire class of things to which it refers, regardless of where or when they exist (Beyer, 1971, pp. 85-86; Manson, 1973, p. 28). If the relationship is suspected but not yet proven, it is called a hypothesis. If the relationship is found to be invariant and of wide applicability, it is often referred to as a "theory", which, if further stands more tests, is often referred to as a "law". The concept of "law" has recently triggered much debate in education (Harvey, 1969; Stufflebeam, et al, 1971; Glass, 1971; Worthen and Sanders, 1973; Walmsley, 1974). However, some comments about laws and theories are here made regarding the disciplines.

Theories and laws are types of generalizations which result from inquiry. One characteristic regarding geography is that it uses knowledge from all fields of studies, for geography is a study of the earth-space. To be able to describe and explain the nature of a particular space, geographers are forced to draw information from any discipline because any chunk of the cultural ecology exhibits the true interplay of human knowledge. It is true that we use many generalizations or "laws in the making" such as "Volumes of movement declines as some function of distance" or "Temperature declines as elevation increases" (Harvey, 1969, pp. 107-113). But if laws are generalizations of this nature they cannot be absolute truths. And some reasons for this have already been cited. As Harvey points out, there is no such a thing as "pure laws" even in the case of studies of natural phenomena because there is no generalization which is absolutely objective. The concept of "objectivity" probably needs a study of its own but when used in relation to human behaviour it should not imply "value-free" generalizations. Man's methods and products cannot be free from his attitudes and values. Every phenomenon we label objective is loaded with human subjectivity. Since our generalizations are abstractions of reality, they cannot be equated to the actual reality. They are mere guidelines to simplify the complexity of the real nature of things. And we cannot avoid generalizations because our concepts which are represented by words or other conventional symbols are themselves abstractions. The linguistic symbols themselves automatically introduce a degree of distortion of the real nature of things. And if what we call laws suffer from such peculiarities of human mind, they cannot be free from such distortions of reality. Assuming that we only work with "soft" laws and theories, one may argue that such generalizations are possible in every field of human thinking. We may of course, have different types of such generalizations depending on the phenomenon being generalized about but generalizations are possible even in the themes of learning which focus on human relations and interdependence and, hence, on values and attitudes and social interaction. For instance, we may generalize that "Juvenile delinquency decreases outward from the city center" or that "Wars are caused primarily for economic reasons", or that "Democracy assumes that man is a being of freedom". And none of these generalizations does not imply the consequences of what we call "science" and its methods and products.

Indeed, "science" has contributed good things to us and every scientific deliberation is in the writer's mind a social matter. Bombs, rockets, medications, automobiles and other forms of transportation, industrial equipment and their consequent pollution, diseases and accidents, all the products of science and technology are social, are cultural. All these have either facilitated or hindered human relations or human interdependence; they have affected his way of life, his values and attitudes towards other humans and the non-living things. They have been a social problem in that they have been the basis for destruction of human species and his environment. They are increasingly becoming the basis for power - military, political, economic and other powers - all of which form typical social problems. There is no scientific deliberation initiated by man which is value-free, none at all. What we should be questioning is whether the methods and products of what we call science which utilizes limited resources from man's cultural ecology should preserve and humanize man or destroy him. Should the methods and products of science perpetuate exploitation of man by man or fair share in the economics of the world? Should they become the means of strengthening that very divisive hierarchy between the In-Heres and the Out-Theres or help to create humane interactions.

among humans? Should physics, chemistry, biology and mathematics be used to create more and better shelter, clothing and food for man or drugs for fatal experimentation on the Out-Theres or for reducing man's behaviour to that of frogs, dogs and amoeba? These are social problems; they are also problems of the person we call a scientist. If what we call science does not involve these problems, it should be given another name; so should be social science. We really need to reconsider our conception of the disciplines we teach, especially in relation to the purpose for which man centers the cultural ecology.

However, generalizing requires that a conclusion derived from examining a specific set of evidence be treated as a hypothesis for testing against new evidence. This means that the inquirer must repeat the same kinds of operations that led to his conclusion in the first place. He must assemble, arrange, and analyze new evidence relating to this conclusion and then determine the extent to which his original conclusion explains this evidence or is substantiated by it. Such an operation may substantially modify his original conclusion, but in most cases it gives the original conclusion greater validity because now the conclusion is based on more evidence and has withstood the test of more examples. The result is a much more reliable piece of knowledge.

As end products of inquiry, generalizations help to predict or explain possible relationships between similar categories of things wherever they may be encountered in the future. They also serve as a handy way of summarizing what is thought to be true about all similar categories of factors even though these may never have been directly observed or tested.

It must be emphasized that generalizations are not by any means absolute truths. The degree to which they approximate reality depends considerably upon the amount of data which has been studied in developing them. Generalizations are at best statements that may be considered relatively true for operational purposes only, but are still held as tentative. All generalizations suffer from distortions of reality and are subject to modification. This is why students should not be fed with someone else's generalizations but should turn them into inquiry questions or problems. For instance, rather than students cramming that temperature declines as the elevation increases, they should be helped to ask: "Does temperature decline as elevation increases?" In the process of investigation they will discover that this generalization holds true within a certain altitude and that under certain atmospheric perturbations the converse actually happens. Like other forms of knowledge, generalizations become obsolete.

As Beyer (1971) points out, generalizations should not be confused with understandings. Understandings are more specific than generalizations in that they refer specifically to some time, place and concrete thing. Yet understandings, like generalizations, represent a product of learning, but they do not result from the final step of inquiry. Instead, understandings may be equated with statements developed as conclusions in the preceeding or fourth step of inquiry. A statement that evolves from testing a hypothesis may be described as an understanding because it customarily describes a rather precise relationship between two very specific factors and because it has specific referents in time and/or place. Understandings thus have little predictive value. However, understandings often serve as the building blocks for high cognitive knowledge and generalizations actually evolve from understandings.

Applying a conclusion, be it in the form of a generalization, understanding, concept or other type of knowledge, to new data involves checking the conclusion against data relating to it but yet unused by the inquirer. The new data may be anything, verbal evidence included. Applying a conclusion to new data may result in different levels or types of knowledge. Concepts, value preferences, and clarification of personal value systems and generalizations evolve through this step of inquiry by giving it conceptual meaning and by proving that his product is applicable and, hence, helps to satisfy his natural desire to know he is correct in his conclusions. Since most students are most likely not to know how to engage effectively in this step of inquiry, they need extensive teacher guidance at least at first. Regardless of how this step is organized, it is crucial to inquiry teaching and learning - that is, during the actual transactions. Application as described above should not come after instruction in the form of final examinations or as exercises terminal to the units or lessons. Examinations-oriented application is not what the philosophy of education for self-reliance calls for.

The products of inquiry should also not be seen as mere statements or generalizations. Inquiry can be undertaken in order to create a tangible product - a booklet, a scholarly paper, a new engine, a plan, or even a cooperative farm or new crop. Students may inquire into the making of and actual production of survey instruments, maps, globes, thermometers, clinometers, booklets and the like.

As Kellum (1969, pp. 110-111) points out, one key to the success or failure of the inquiry strategy is the teacher's talent for questioning. That an effective questioning technique is crucial is demonstrated by greater attention given to it in educational literature.[7] Even some studies (Taba and Elzey, 1967; Gallagher, Aschner and Jenne, 1967) have confirmed the significance of questions in teaching-and-learning process. Yet other studies have revealed the 'paucity of attention given to the creation of questions and to the questing technique' (Eulie, 1968, p. 43).

A question, however, is the most important of all techniques of inquiry teaching. An effective questioning technique is crucial because they are the questions that guide students through the process of learning by inquiry. And since questions influence what students learn and how they learn it, it is significant that most questions used in teaching-and-learning process should reach far beyond those utilized by expository teaching both in the form and degree of sophistication. Inquiry questions should be more than remembering requestions, that is, questions that require a student to remember the information in approximately the same form in which it was mastered. Remembering questions are typical of expository teaching. Examples of remembering questions are: "Name the capital of Uganda", "Define lapse rate", "What are the three ways of stating a scale of a map?", "List five major crops grown in Tanzania". Suggestions included in the syllabus that during the examinations students should reproduce specific information and examples studied from textbooks and other sources are suggesting remembering questions and encouraging rote learning.

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[7] See, for example, Eulie (1968); Morgan and Shreiber (1969); Bloom et al (1956); Hunkins (1970; 1972); Monk (1971); Richburg and Vuicich (1970); Taba, Durkin, Fraenkel and McNaughton (1971); Guilford (1967); Manson (1973); Sanders (1966; 1968); Bloom, Hastings and Mandaus (1971); Clegg and Manson (1971).

Of course, remembering significant facts, ideas and conventions is important and remembering questions have an important role to play in geographic education for self-reliance. But exclusive use of remembering questions is logically and empirically inconsistent with educational goals related to problem solving, decision making, creativity and values and attitudes. They hardly teach students to think. If about 'two-thirds to four-fifths of the typical school day is taken up with questioning activities'

(Morgan and Schreiber, 1969, p. 4), and should this time be spent asking remembering questions, our teaching will not deserve being called inquiry-based.

Numerous literature and guides are available which teachers should consult for purposes of improving their questioning techniques. Teachers should be able to ask challenging questions if they have to become efficient inquirers and inquiry teachers. It is also important that teachers should teach students how to ask good questions. Most discussions on questioning are predicted on the model "the teacher asks - the student answers". However, it is both possible and desirable to reverse this model by aiding and encouraging students to pose and answer questions which they believe significant, meaningful and interesting. Indeed, this is the essence of inquiry teaching strategy and inquiry learning - to help a student find out an answer or solution to the question or problem genuine to him.

IV. ORGANIZING INQUIRY TEACHING AND INQUIRY TRAINING

A general discussion on how to organize instructional content was presented in chapter four. Here the focus is upon how teaching and learning could be organized around inquiry process.

The five stages of inquiry process may be reduced to and be subsumed under three basic categories: an introduction or "opener", a body or "development", and a conclusion (Kellum, 1969, p. 99;

Taba, Durkin, Fraenkel and McNaughton, 1971, pp. 64-103; Beyer, 1971, p. 132). These components can form the basic framework for organizing any inquiry lesson, unit or course of study for students at all form levels.

An introduction or opener is an initial phase of an inquiry lesson, unit or course and involves developing a purpose for inquiring and sometimes hypothesizing. The body or development is that part wherein we hypothesize, test our hypotheses, and conclude about them. The conclusion involves tying up the entire study and application.[8]

Beyer (1971) has illustrated how this framework might be used to organize a course in geography basing on traditional world regions or "world cultures". This scheme, however, might as well be used to avoid the coverage of countries, continents and world cultures while maintaining the global awareness of phenomena and problems. Take, for instance, Forms 1 - 4 Syllabus (Appendix I, 1973). All of its content matter might be categorized and studied under the topics AGRICULTURE, INDUSTRIALIZATION, URBANIZATION and POPULATION. Of course these themes would and should overlap and even other themes might be identified. The four topics might be approached by being illustrated by any area of the world and by any period of time according to the problems being investigated. Courses, units and lessons dealing with these themes could and should be organized according to the above framework.[9]

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[8] For illustrations of how courses, units and lessons can be organized according to this framework, see Beyer (1971, pp. 132-156).

One point must be emphasized regarding lesson plans. Certainly, preparation and implementation of plans that are built on the framework of inquiry process will make inquiry teaching a reality. But any lesson plan should be seen as a mere working sketch or an outline for guiding the actual instruction. Under no circumstances should the teacher equate a mere blueprint of any kind with the actual classroom transactions. Nor should the teacher be the slave of the lesson plan, be it prepared by him or given (as in the case of ready-made programs) and he should not impose it on students. Any lesson plan should be flexible enough to allow student's inquiry and to accomodate for the unexpected situations. There is no plan that can precisely predict what will actually happen during instruction. Each lesson is a new experience to a different class; so a single lesson plan which has to be used in several classes must be seen as a scheme guiding a new experience for each class and in fact for each student in each class.

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[9] See Beyer (1971, pp. 143-157); Kellum (1969, pp. 88-99) and Delaney (Short and Marconnit, 1968, pp. 248-249) for detailed discussions on lesson plans.

V. NEED FOR MODELS OF SCHOOL-COMMUNITY INTEGRATION

The emphasis given in the philosophy of education for self-reliance on the integration of the schools with the communities is the awareness of many problems which have had prevailed in our educational system. Students have to learn directly from the real world environment rather than merely be confined to the utilization of the display environment. Students have to be involved in transforming the real world environment into the decision environment and, hence, learn through practical experiences which are entirely rejected by academic rationalists. Programs have to help students utilize personal and social freedom to improve man's relationship to the social-physical-biotic environment. This means that students have to directly engage in social action which might be defined as 'that participation in real-life situations which result when knowledge about the problem and rational decisions made concerning possible solutions, studied in the classroom, are translated into effective action within the community - whether that community be inside or outside the walls of the school' (Press, 1974, p. 1).

Emphasis on the integration of the school with the community is the awareness that schools need contact with the realities of life; that programs are most effective when closely related to the communities they serve; and that students learn and transfer best when dealing with direct, concrete experience.

Certainly, isolation from direct experience is a real danger. It is possible for schools to become so isolated from parents, community agencies, media of communication, and other unifying agencies that they lose touch with the organic life of the community. When this happens, the school program not only becomes meaningless but the school jeopardizes its much needed community support (Collings, 1967, p. 1).

Traditional programs have often involved students in the acquisition of knowledge for its own sake. Education for self-reliance calls for programs similar to those described by Chamberlin and Massey (1974, p. 2) - programs which should provide a tight integration of (a) developing knowledge related to problems; (b) clarifying values and attitudes related to these problems; and (c) encouraging social action to resolve those problems. Traditional programs or syllabi have hardly taken advantage of the real world to which schools belong as a laboratory for learning and applying concepts and other tools of inquiry to generate knowledge from it. Yet the community in which the school is located can become such a laboratory for a more open-ended, problem solving program.

Education for self-reliance requires schools not only to learn directly from the real world, but also to become economic as well as educational communities and, thus, to become integral parts of the environning communities. Indeed, several schools have achieved these goals particularly in accordance with the guidelines which were suggested by the 1967 conference of all Regional Education Officers on education for self-reliance. The 1974 Musoma resolution which requires Form Six leavers to be absorbed into various walks of life before being recommended for University admission is another sound step towards meeting this end. However, along with these efforts we still need to continuously find out various models of or strategies for integrating the schools and other educational institutions, the University included, with the communities. Several models are required because what may smoothly work with the primary schools may not work with the University or secondary schools. Models which may effectively integrate urban schools are likely not to be very effective for rural schools. Boarding schools may need a different strategy from that which best suits day schools. Therefore, multiple ways are needed to integrate all educational institutions with their immediate communities.

Specific problems related to school-community integration have been discussed elsewhere (Bacchus, 1972; Mbilinyi, 1973), and they need not be repeated here. However, a few points must be stressed.

An effective strategy for school-community integration will have to center on cooperation rather than competition among the school and the community in which the school is located. In some schools the activities of the school and those of environning community have tended to be divisive rather than integrative because such activities have been performed competitively. This competition has in turn tended to create a definable boundary among the school and the community. A school shop is seen by community dwellers as competing with the community's cooperative shop; so is the school farm, the school workshop and its other economic enterprises. Conversely, the school sees itself being competed by the community's cooperative shop and the like, let alone private enterprises. Even some cultural activities have been competitive and divisive rather than integrative. The school, for example, conducts a football team against the environning community rather than the competing teams comprising a mixture of members from the school and the environning community. So have been other social functions. The problem here has not been competition _per se_ but the lack of a strategy to make competition become subordinate to cooperation.

For effective integration of the school with the community, however, we need to bring the two parties together in a way they will act together and mutually share the responsibility and risk involved in their cooperative social actions. The school together with the immediate community members have to practice common ownership of certain actions or enterprises. For instance, a school could invest in a community's cooperative shop or farm and vice versa; or both parties could own one shop or farm irrespective of its location. The community's library could as well become the school's library and both parties would directly participate in its use and maintainance. Such cooperation would extend to numerous activities and the decisions would involve both the school and the members of the immediate community.

Payoffs of such cooperative strategy would be several. It would change the negative values and attitudes of both students and teachers towards the community and of the community members towards the school population. The divisive boundary would disappear through both parties having the reason for meaningful transactions. Parents and other adults, students and teachers together would participate in making decisions about common goals and objectives and would directly learn from each other. It would thus be one efficient way to operationalize our aims of "participation" and "cooperative endeavour". The economic activities involved would operate at a larger scale and with assurance that they could continue being undertaken when students were on holidays, especially in the case with boarding schools.

Students in particular would get the opportunity to undergo real life decision making process. They would be able to transfer classroom experiences directly into the real life situations. Adult education would also be facilitated this way.

In some situations students would need to learn from activities other than those available in the very immediate environment. For instance, students could be required to join real life walks of life - industries, offices, shops, farms, government stores - for a certain period of time so that they learn from the experiences of other workers and peasants. These real world workers and peasants could at times come to school to teach and learn.[10]

In short, students have to learn through understanding by practiving the community life itself not after Form four or Form six education but throughout their primary and secondary education and even after these levels of education. Real life learning has to be continuous rather than intermittent. Boarding schools are likely to do this just occasionally but the most desirable situation would be to get the students to become full members of the community. This way, it would be possible for students to realistically work and learn from the community and cooperation between the school and the community would be maximized.

Should direct learning become the major educational orientation, book learning will no longer be a problem because knowledge will be acquired for solving actual rather than hypothetical problems. And if direct learning should become continuous, it will no longer be necessary for Form six leavers to be absorbed into the community's walks of life before they proceed for higher education because they will have lived and worked in the communities throughout their lives. At this stage each student will have decided on the type of vocation or profession he wishes to study for at the University or any other institution. His post-secondary education will have been backed by very firm real life experiences.

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[10] For similar strategies see Outwater (1973); Maruyama (1975).

Emphasis on direct learning means that our Teacher Colleges and University should emphasize similar experiences. Here, too, students should learn from the community and solve practical problems as they learn rather than merely engage in romantic thinking and display learning.

Although educational simulations are said to be one effective tool for changing student attitudes and values, they are mere approximations to real situations. Since they are often hypothetical constructs or models, educational simulations suffer from distortions of reality and they tend to limit a learner to the use of display transactions within the classroom walls. Educational simulations are of course better than nothing and may be particularly helpful in simulating situations which cannot be found in the immediate environment or which cannot be brought into the classroom by other means. Yet, educational simulations are not appropriate for effective integration of the school with the community; they are only secondary to direct learning.

As was pointed out in chapter two, direct learning has its limitations. Since we are to learn from what others do - those in areas or regions outside the immediate community or outside Tanzania - we cannot avoid using display information in a classroom situation. However, the investigation of problems of other countries that are similar to ours may very well be integrated with a direct experience. For instance, while students would be engaged in the investigation of soil erosion in the village in which they would be living, working and learning, they could observe how similar soil erosion problems were being tackled in say, Brazil or Nigeria. Any relevant information got from such an investigation would be tried by students to solve problems of soil erosion in this village. Aid from field agricultural personnel would make the experience more cooperative and more meaningful.

The process of integrating the school with the community requires a reconsideration of the time factor in our schools. We have to rethink about the traditional timetables which tend to divorce the school from the life of its environning community. As Eisner (1975) has pointed out, the timetable of the school day imposes itself on the entire program of the school. Timetables are designed in accordance with the disciplines - the practice which confirms that academic rationalism is still very fresh in our schools. Almost every classroom experience is tailored to the fixed time to teach funded knowledge. It is true, as Eisner (1975, p. 10) puts it, the problem that follows from such a technology of time is that students cannot immerse themselves into a program without having to shift gears at regular intervals during the day. A teacher who has something good going with his class must bring it to a close because another teacher is waiting for his students. Besides, there might be other students waiting to come in. Clock time rather than body time, or the time needed to satisfy the demands of the task, and one suited for effective inquiry teaching-and-learning, becomes the primary determinant for the style of teaching and learning. Here, too, we are faced with a problem of mechanistic teaching and learning. Timetables are designed in the way they were fifty or so years ago. For many of us schools are the way they are today simply because they have been that way in the past. But if we are to succeed in integrating the school with the community, the present timetables will have to be abandoned. Time will have to be less of a problem because when the integrated community yields personal, collective, professional and vocational satisfactions, those who are a part of it will not be concerned about the time the planning and implementation of the community actions entail.

This chapter has tried to indicate some educational problems related to learning experiences and teaching strategies. The major emphasis has been that for students to develop inquiry minds, self-confidence and ability to learn from others, for them to effectively integrate with their immediate communities, and thereby learn by direct experience, we educators must be clear of the concept of inquiry and we must engage in inquiry ourselves if we have to successfully teach by inquiry teaching strategy. Certainly, there is no single "right way" to teach and inquiry teaching strategy is not the only strategy available. It may indeed have its own limitations and problems, yet inquiry teaching strategy is certainly the best way of achieving our key aims of education for self-reliance. To be successful inquirers, we teachers require considerable practice; we as well need to learn by doing - by practical, real life inquiry itself. Zevin's (1973) study has shown that teachers need deliberate training in teaching by inquiry. Teacher Colleges and the University must as well prepare teachers to become inquirers. Educators in these institutions need also to practice inquiry and to be able to teach it effectively. Should this not be the case, that notorious cycle of "poor teacher-poor student-poor teacher" will definitely perpetuate.

The integration of the school with the community should be continuous, and should base on a variety of models. But effective integration process will require real cooperation among all those involved and the traditional beliefs in academic rationalism and traditional timetables will have to be abandoned.

CHAPTER VI

EVALUATION AND CONCLUSIONS

'What we need to do now is thinking first about the education we want to provide, and when that thinking is completed think about whether some form of examination is an appropriate way of closing an education phase. Then such an examination should be designed to fit the education which has been provided' (Nyerere, 1968, p. 282).

This and other statements cited earlier from the "Education for Self-Reliance" about examinations require educators to re-think about the whole concept of "evaluation" in the light of our aims of education. That evaluation has to be given special attention is also explicit in the Musoma resolution of November, 1974. What is evaluation? What should be the goal of evaluation? What should be the role of evaluation? Who should evaluate? How should the process of evaluation be performed? These and many other questions must be raised and tackled continuously.

Like other key concepts commonly used in educational discourse, evaluation seems to be another complex term. Although there has lately been a proliferation of literature on it, evaluation remains a controversial theme and it seems much of the educational problems are "embedded" within this concept. This is probably due to the fact that evaluation pervades every educational aspect which makes it a very wide educational concern. Some educators (Worthen and Sanders, 1973, pp. 10-17) have in fact labelled evaluation as a "disciplined inquiry".

Table 2 is a useful summary of twelve important evaluation components that have been discussed by the indicated writers. This matrix which was prepared by Worthen and Sanders (1973) might serve many roles some of which are to explicate the complexity of evaluation and points of agreement and of controversy. It might also provide a basis for one to perform an independent inquiry into each of the twelve components and, hence, other facets of evaluation. This is primarily why it has been used here[11].

This discussion focuses on one problem of evaluation: the definitions of evaluation. The problem has been selected on the belief that much of the problematic areas in educational evaluation stem from this issue. It seems that once a particular definition of evaluation is in use, it has a direct impact on the type of evaluation activities conducted (Worthen and Sanders, 1973, p. 21). As Table 2 suggests, a particular "purpose" of evaluation seems also to have a direct relationship with a particular definition. For this reason, several definitions which also imply particular schools of thought in evaluation are reviewed and related to some evaluation problems. Particular attention is given to the goal and roles of evaluation.

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[11] To appreciate the usefulness of this Table, the reader is advised to read the works of the selected writers. Their works appear in Worthen and Sanders (1973); Taylor and Cowley (1972); Popham (1974); Stufflebeam _et al_ (1971); and many other publications.

I. DEFINITIONS OF EVALUATION

Eight definitions are summarized in Table 2. However, four schools of thought about how evaluation should be defined have been identified (Stufflebeam _et al._ 1971, pp. 9-16); Worthen and Sanders, 1973, pp. 17-26). The definitions advocated by these schools of thought have gained common and wide acceptance, yet each seems to have its limitations and strengths. Their identification will help us discover the definitions commonly used in our Teacher Colleges, University and schools and may provide the basis for future discussions and improvement of our thinking about evaluation. They include measurement definition, congruence definition, professional judgment definition, and ascertainment of value-decision making definition.

1. The Measurement Decision

This definition equates evaluation with educational measurement. Thorndike and Hagen (1961) and Ebel (1965) are among the advocates of this definition. It came into use with the ascendency of the measurement movement which seemed to filter into education through the practice of the psychologists. With this movement, the instrumentation developed by measurement people has provided the conceptual basis for evaluation. The measurement

TABLE 2: Comparisons of Contemporary Evaluation Models on Selected Characteristics.

	STAKE	SCRIVEN	PROVUS	HAMMOND	STUFFLEBEAM	ALKIN	PERSONAL JUDGEMENT (e.g. Accreditation)	TYLER[a]
DEFINITION	Describing and judging an educational program.	Gathering & combining performance data with weighted set of goal scales.	Comparing performance against standards.	Assessing effectiveness of current & innovative programs at the local level by comparing behavioral data with objectives.	Defining, obtaining, & using information for decision-making.	The process of ascertaining the decision areas of concern, selecting appropriate information, & collecting & analyzing information.	Focusing attention on processes of education using professional judgment. Development of standards for educational programs.	Comparing student performance with behaviorally stated objectives.
PURPOSE	To describe and judge educational programs based on a formal inquiry process.	To establish & justify merit or worth. Evaluation plays many roles.	To determine whether to improve, maintain, or terminate a program.	To find out whether innovation is effective in achieving expressed objectives.	To provide relevant information to decision-makers.	To report summary data useful to decision-makers in selecting among alternatives.	To identify deficiencies in the education of teachers & students relevant to content & procedures, self-improvement.	To determine the extent to which purposes of a learning activity are actually being realized.
KEY EMPHASIS	Collection of descriptive & judgmental data from various audiences.	Justification of data gathering instruments, weightings, & selection of goals. Eval. model combining data on different performance scales into a single rating.	Identifying discrepancies between standards & performance using team approach.	Local program development.	Evaluation reports used for decision-making.	Evaluation reports used for decision-making.	Personal judgment used in evaluating processes of education; self-study.	Specification of objectives & measuring learning outcomes of pupils.
ROLE OF EVALUATOR	Specialist concerned with collecting, processing, & interpreting descriptive & judgmental data.	Responsible for judging the merit of an educational practice for producers (formative) & consumers (summative).	A team member who aids program improvement & counsels administration. He should be independent of the program unit.	Consultant who should provide expertise in data collection. He is also a trainer of local evaluators (program personnel).	Specialist who provides evaluation information to decision-makers.	Specialist who provides evaluation information to decision-makers.	Professional colleagues who make recommendations—a professional judge.	Curriculum specialist who evaluates as part of curriculum development & assessment.
RELATIONSHIP TO OBJECTIVES	Examination of goal specifications & priorities. Identification of areas of failures & successes. It is up to the evaluator to assist in writing behavioral objectives.	Look at goals & judge their worth. Determine whether they are being met.	Agreement of evaluation team & program staff on standards. Comparison of performance against standards to see whether a discrepancy exists.	Evaluation focuses on the definition & measurement of behavioral objectives.	Terminal stage in context eval. is setting objectives; input eval. produces ways to reach objectives; product eval. determines whether objectives are reached.	Range & specificity of program objectives determined in systems assessment; program planning produces ways to reach objectives; program improvement provides data on the extent to which objectives are being achieved; program certification determines whether objectives are reached.	Self-study judgments are based on sets of predetermined criteria.	Evaluation implies attainment of behavioral objectives stated at the beginning of the course.

TABLE 2: Comparisons of Contemporary Evaluation Models on Selected Characteristics.

	STAKE	SCRIVEN	PROVUS	HAMMOND	STUFFLEBEAM	ALKIN	PERSONAL JUDGEMENT (e.g. Accreditation)	TYLER[a]
RELATIONSHIP TO DECISION-MAKING	Descriptive & judgmental data result in reports (including recommendations) to various audiences. Judgments may be based on either absolute or relative standards.	Evaluation reports (with judgments explicitly stated for producers or consumers) used in decision-making.	Evaluation staff collects information essential to program improvement & notes discrepancies between performance & standards. Every question involves a criterion (C), new information (I), & a decision (D). Eval. provides the new information.	Evaluation is the source on which to base decisions about instructional, institutional, & behavioral dimensions.	Evaluation provides information for use in decision-making.	Evaluation provides information for use in decision-making.	When deficiencies are found, program revisions are requested, thus correcting sub-standard conditions; corrective process built in.	Actual pupil performance data will provide information for the decision-maker to use on strengths & weaknesses of a course or curriculum.
TYPES OF EVALUATION	(1) Formal vs. informal.	(1) Formative—summative. (2) Comparative—noncomparative (3) Intrinsic—payoff. (4) Mediated.	(1) Design. (2) Installation. (3) Process. (4) Product. (5) Cost.	(1) Instructional dimension. (2) Institutional dimension. (3) Behavioral dimension used for describing programs.	(1) Context. (2) Input. (3) Process. (4) Product.	(1) Systems assessment. (2) Program planning. (3) Program implementation. (4) Program improvement. (5) Program certification.	(1) Self-study. (2) Visitation. (3) Annual reports. (4) Evaluation panels.	Pre-post measurement of performance.
CONSTRUCTS PROPOSED	(1) Data matrices: description (intents & observations) & judgment. (2) Processing descriptive data: contingency among antecedents, transactions, outcomes; congruence between intents & observations. (3) Bases for forming absolute & relative judgments.	(1) Distinction between goals (claims) & roles (functions). (2) Several types of evaluation.	(1) Discrepancy concept. (2) Feedback & revision of objectives and/or program.	(1) The application of evaluation design to existing program. (2) Decisions about adequacy of current program in relationship to the objectives. (3) Feedback from (2) leads to innovation. (4) Application of evaluation to innovation itself. (5) Notion that feedback could continue.	(1) Context eval. for planning decisions. (2) Input eval. for programming decisions. (3) Process eval. for implementing decisions. (4) Product eval. for recycling decisions.	Evaluation of educational systems vs. evaluation of instructional programs; five areas of evaluation.	Use of content specialists as judges.	(1) Statements of objectives in behavioral terms. (2) Teaching objectives are pupil-oriented. (3) Objectives must consider pupil's entry behavior, analysis of our culture, school philosophy, learning theories, new developments in teaching, etc.
CRITERIA FOR JUDGING EVALUATION	(1) Should be panoramic, not microscopic. (2) Should include descriptive & judgmental data. (3) Should provide immediate relative answers for decision-making. (4) Should be formal (e.g. objective, scientific, reliable.)	(1) Should be predicated on goals. (2) Must indicate worth. (3) Should have construct validity. (4) Should be a wholistic program evaluation.	(1) Team involvement. (2) Assume one-to-one correspondence between design & solution. (3) Compare performance against standards as a tool for improvement & assessment. (4) Periodic feedback	(1) Related to behavioral objectives (2) An on-going process. (3) Provides feedback on goal achievement for program modification. (4) Uses local personnel, and is part of local educational program.	(1) Internal validity. (2) External validity. (3) Reliability. (4) Objectivity. (5) Relevance. (6) Importance. (7) Scope. (8) Credibility. (9) Timeliness. (10) Pervasiveness. (11) Efficiency.	Information provided to a decision-maker should be effective & not confusing or misleading. Appropriate evaluation procedures should be used for different decisions.	(1) Reflects interests of program administrators. (2) Standard criteria often used.	(1) Behavioral objectives clearly stated. (2) Objectives should contain references not only to course content but also to mental processes applied.

TABLE 2: Comparisons of Contemporary Evaluation Models on Selected Characteristics

	STAKE	SCRIVEN	PROVUS	HAMMOND	STUFFLEBEAM	ALKIN	PERSONAL JUDGEMENT (e.g. Accreditation)	TYLER[a]
IMPLICATIONS FOR DESIGN	Very general structure. Matrices should be included in design.	(1) Look at many factors. (2) Be involved in value judgments. (3) Require use of scientific investigations. (4) Evaluate from within (formative) or from without (summative).	(1) Provide continuous evaluation (feedback loops). (2) Provide relevant & timely information for making decisions. (3) Provide cost-benefit analysis. (4) Involvement of evaluation in program development.	(1) Use of multi-variate structure—focus on interactions of dimensions. (2) Generate empirical research. (3) Necessity for inclusion of local personnel.	(1) Experimental design not applicable. (2) Use of systems approach for evaluation studies. (3) Directed by administrator.	Evaluation domain determined by the decision-maker; the objects of evaluation vary along a continuum from discrete, definable objects to complex systems.	(1) Involvement of professional community. (2) Quick feedback.	(1) Need to interpret & use results of assessment. (2) Develop designs to assess student progress.
CONTRIBUTIONS	(1) Provides a systematic method for arranging descriptive & judgmental data, thus emphasizing inter- & intra-relations between them. (2) Considers both absolute & relative judgment. (3) Requires explicit standards. (4) Generalizability of the model.	(1) Discriminates between formative (on-going) & summative (end) evaluation. (2) Focus on direct assessment of worth, focus on value. (3) Applicable in diverse contexts. (4) Analysis of means & ends. (5) Delineation of types of evaluation. (6) Evaluation of objectives.	(1) Provides continuous communication between program & evaluation staff through feedback loops. (2) Allows for program improvement as well as assessment either at early stages or at end. (3) Acknowledges alternative procedures in adjusting objectives & in changing treatment. (4) Forces explicit statement of standards.	(1) Makes use of local personnel who can carry on evaluation process once initiated. (2) Considers inter-action of several dimensions & variables. (3) Provides feedback on program development & revisions: stresses self-evaluation. (4) Requires specification of behavioral objectives.	(1) Provides a service function by supplying data to administrators & decision-makers charged with conduct of the program. (2) Is sensitive to feedback. (3) Allows for evaluation to take place at any stage of the program. (4) Wholistic.	(1) Provides a service function to administrators & decision-makers. (2) Allows for evaluation to take place at any stage of the program. (3) Wholistic.	(1) Is easy to implement; team can observe & make judgment. (2) Has little lag time between observations made, data collected, & feedback. (3) Breadth of variables noted is large. (4) Leads to self-study habit & self-improvement.	(1) Is easy to assess whether behavioral objectives are being achieved. (2) Is easy for practitioners to design evaluative studies. (3) Checks degree of congruency between performance & objectives; focus on clear definition of objectives.
LIMITATIONS	(1) Inadequate methodology for obtaining information on key constructs. (2) Some cells of design matrix overlap, some distinctions not clear. (3) Possibility of leading to internal strife within program; value conflicts possible.	(1) Equating performance on different criteria & assigning relative weights to criteria creates methodological problems. (2) No methodology for assessing validity of judgments. (3) Several overlapping concepts.	(1) Demands a lengthy time commitment; may be expensive to carry through. (2) Inadequate methodology for establishing standards. (3) Requires large, expert, well-articulated staff. (4) Designed for complete evaluation; partial evaluation not considered.	(1) Difficulty of quantifying data involving several dimensions & variables. (2) May be complex & time-consuming to set up. (3) Possible fixation of evaluation on the "cube." (4) Neglects judgmental dimension. (5) Motivation problem in local personnel.	(1) Little emphasis on value concerns. (2) Decision-making process is unclear; methodology undefined. (3) May be costly & complex if used entirely. (4) Not all activities are clearly evaluative.	(1) Role of values in evaluation unclear. (2) Description of decision-making process incomplete. (3) May be costly & complex. (4) Not all activities are clearly evaluative.	(1) Objectivity & empirical basis are questionable. (2) Attention to process of education not balanced by attention to consequences. (3) Replicability is questionable.	(1) Tendency to oversimplify program & focus on terminal rather than on-going & pre-program information. (2) Tendency to focus directly & narrowly on objectives, with little attention to worth of the objectives.

[a] A variation of the Tylerian model developed by N.S. Metfessel and W.B. Michael is included in Chapter 4. The Metfessel-Michael paradigm is not included in this compilation of evaluation frameworks because of the substantial overlap with the Tylerian model which is included here.

devices (test items) which are supposed to be "reliable" and "objective" have resulted in scores and other indices that are mathematically and statistically manipulable. This has made possible the handling of masses of data, especially through the use of a computer, and the easy comparison of individuals or classroom scores with group norms. From this school of thought our educational institutions have adopted the common practice of analyzing and interpreting evaluation data in terms of normal distribution curves and in relationship to standardized (norm-referenced) tests, and some of which are now selling on the market[12]. The measurement movement, however, still exists and continues to be defended through the advocacy for the use of experimental designs in evaluation (Worthen and Sanders, 1973, pp. 220-224).

Some disadvantages of the measurement definition have been identified by several educators. First, evaluation is given an instrumental focus; the science of evaluation is viewed as the science of instrument development and interpretation. Second, the approach obscures the fundamental fact that value judgments are necessarily involved in the conception of evaluation. Third, evaluation is limited to those variables for which the science of measurement has successfully evolved instruments. Other variables become known as "intangibles" represented by "loaded" words (Mager, 1962), a characterization equivalent to saying they cannot be measured and, hence, have no utility and ultimately no importance (Stufflebeam _et al_, 1971, p. 11).

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[12] For a list of some published tests in geography, see Senethirajah and Weiss (1971, p. 102).

Believers in measurement definition have as a result always advocated the sort of teaching-and-learning that is tailored to the achievement of the "tangibles", the measurable which has also been facilitated by the teaching machines and their concomitant uni-linear program models. It is most likely, as Aoki (1974) points out, that teaching of the testable has tended to overlook the existential relationship between student and teacher. The emphasis on the production of empirical testable results might have tended to cause the relationship between the teacher and the student to become detached, objectified and secondary rather than primary and typically humane. Thus the limits placed upon evaluation because of a lack of instrumental sophistication has come to be viewed as the real limits. Furthermore, the instrumental focus has introduced an element of inflexibility because of time and cost involved in producing new instruments. In sum, this definition might have resulted in an evaluation which is too narrow in focus, too mechanistic in approach, and in detachment of the student from the teacher. Indeed, the language of "measurement" is now changing into that of "assessment". The philosophy and motivation underlying the measurement movement needs to be the concern of every educator whose educational orientation is towards humanistic rather than mechanistic education.

2. The Congruence Definition

Another widely used definition has been that of determining the congruence between performance and objectives, especially those stated in terms of measurable, overt student's behaviours. The elements of such objectives were observed in chapter three.

The requirement that instructional objectives should be stated in measurable terms establishes the overlap between this definition and the measurement definition. Even the congruence definition emphasizes measurement of student behaviours and teaching of the testable. The objectives have to include "unloaded" action verbs which are assumed to represent the precise intended behaviours of the learners.

This definition was first proposed by Ralph Tyler as an outgrowth of his work on the Eight-Year Study of the 1930's (Stufflebeam et al, 1971, p. 11; Taylor and Cowley, 1972, pp. 1-4; Worthen and Sanders, 1973, p. 20). This definition is typical of Tyler's (1950) rationale of curriculum and instruction. For Tyler, 'Education is a process of changing the behaviour patterns of people' (p. 6). Stemming from this conception of education, Tyler sees evaluation as the process of comparing performance with clearly defined objectives:

> 'The process of evaluation is essentially the process of determining to what extent the educational objectives are actually being realized by the program of curriculum and instruction. However, since educational objectives are essentially changes in human beings, that is, the objectives aimed at are to produce certain desirable changes in the behaviour patterns of the student, then evaluation is the process for determining the degree to which these changes in behaviour are actually taking place' (p. 105-106).

The congruence or "matching" definition is the most used definition of evaluation in our educational literature. For instance, Lema (1973) exemplifies this definition when he writes:

> 'Evaluation in curriculum should enable us to compare the actual outcomes with intended outcomes, and on the basis of this comparison to decide on the future action. Evaluation is itself a process - a process carried out to determine how well an educational program is achieving its objectives. It follows that the most precise and specific the behavioural objectives of the curriculum, the easier it becomes to evaluate its outcomes' (p. 45).

Some advantages of congruence definition have been identified (Stufflebeam *et al*, 1971, p. 12). First, according to Tyler's original conception, evaluation has not to focus only on the student; it could also be used to provide insights about the "static" program components and the processes used to produce them. Second, a practical means is available to provide feedback. Third, evaluation could be carried out in relation to defined objectives and, thus, has a concrete referent and certain built-in criteria. Note that these are advantages in terms of this definition.

This congruence definition, however, has serious disadvantages (Stufflebeam et al, 1971, pp. 12-13). First, it places the evaluator within very narrow technical constraints. The evaluator's major task is viewed typically in terms of generating a sufficiently operational set of objectives to make possible the required congruence assessment. Although Tyler has lately emphasized objectives stated in Mager's (1962) formulation, his original rationale conceives "behaviour" to include the "intangibles" for he uses 'behaviour in the broad sense to include thinking and feeling as well as overt action' (Tyler, 1950, p. 6).

For evaluation purposes, this school of thought insists that each operational objective must consist of an evaluative criterion device. This is built into each objective in order to ease the task of constructing "criteria-referenced" tests. Thus, each objective can be utilized directly as a test item. The statement "to list five major crops grown in Tanzania" could easily be converted into a question "List five major crops grown in Tanzania". Such statements and questions, however, have tended to encourage teaching of the testable. They render themselves easily to remembering questions.

A second disadvantage which is also related to the one above is that objectives are seen to be statements about student's behaviours and such statements are seen to be the only content of "curriculum" (Gagné, 1967). This compels the evaluators to assess everything in terms of effects on students, even though what might be being assessed could be a new staffing procedure, teacher's attitudes toward an educational policy, or a way of shelving library books. Positive changes in student behaviour is called "achievement" and this has come to be the cornerstone for all evaluative efforts. Related to this is the earlier suggestion on the need to encourage teacher-focusing objectives which could be used by teachers to evaluate their activities. For purposes of evaluation, intents could be stated in terms of any phenomenon that has to be evaluated. Any evaluation of instructional transactions is incomplete if it merely describes the student's activities to the exclusion of teacher's activities and the teaching-and-learning environment. It is probably possible that the performance of students can be used to make valid judgments regarding the performance of the teacher, generally in terms of the previously established class minimal level of student performance (Popham and Baker, 1970, p. 130). But the reason that causes these writers to suggest that the performance of the student cannot be generalized from the assessment of teacher's performance is the same reason that should cause us to hesitate generalizing the performance of the teacher from the assessment of student's performance. Moreover, not everything learned by the student is the result of teacher's participation in facilitating student learning.

One consequence of the congruence definition, therefore, has been the notion that a teacher gives his students examinations to ascertain the degree to which they have "learned" that knowledge which the teacher has "taught" which implies that it is the student and not the teacher who should always be evaluated. This notion also filters into the classroom transactions in which the questioning technique is based on the model, "the teacher asks-the student answers".

A third and major disadvantage of the congruence definition is the problem of unilinearity observed in chapter three. The emphasis on student overt behaviours has caused evaluation to become a *post facto* or terminal technique, despite the obvious implications of Tyler's formulations for feedback and for process evaluative data. This terminal emphasis has led to the conception that instructional objectives mean statements of what the student will be able to do not during but after instruction. With their attention riveted to achievement, evaluators have tended to overlook process because the really important data, product data, would be available only at the end of instruction when student behaviours could be checked against the objective. This point will be given emphasis later in relation to terminal examinations.

3. Professional Judgment Definition

In the case of the measurement definition and to some extent in the case of congruence definition, the matter of placing value on the data was or has been merely taken for granted. A third definition of evaluation equates evaluation with professional judgment[13]. This general approach to evaluation, which historically has been the most widely used evaluation strategy of educators, is exemplified by the use of "experts" to produce professional judgment about a phenomenon being observed. An example of this approach is provided by the visits by inspectors from the Ministry of National Education to schools and colleges. Another illustration of this definition is what is called "moderation" in our Teacher Colleges whereby the principals of certain colleges assess the performance of the students in another college.

The main emphasis of the professional judgment approach to evaluation is that of application of presumed expertise to yield judgments about the quality or effectiveness of what is being evaluated. The judgments are based on opinions of these experts whether or not the data and criteria used in reaching those judgments are clear. In some instances the actual judgments are made by the visiting persons. Usually, however, these experts visit the school or district for a relatively short time, collect data largely by impressionistic means, and then evaluate. The evaluation is whatever they say, good or ill.

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[13] In Figure 31 this definition is summarized in the column labelled "Personal Judgment".

Some advantages of the professional judgment definition can be identified. First, the evaluation is quickly managed. Second, it is one common non-statistical way of evaluating without being artificially constrained by "instruments". Its key means of collecting data is direct and indirect observation of the phenomenon being evaluated. Third, the interplay of a variety of factors in a situation is taken into account more or less automatically, so that the evaluator is free of the need to relate and aggregate data after he has collected them. Fourth, there is no appreciable lag between data collection and judgments, no waiting while data are being processed or having evaluation terminal. Lastly, evaluations can be made while a free and living transactional activity is being undertaken. With appropriate relationship between evaluator and evaluated (which is sometimes hard to establish) realistic assessment of human interactions can be described with minimal distortions of what they really are. Appropriate relationship with "external" evaluator and evaluated are most likely to be established if the evaluator participates fully in the activity of the institution for a reasonably long period of time.

Despite the above advantages, the professional judgment definition, especially in its unmodified state, has notable disadvantages. The one often cited is that the reliability (accuracy and consistency) and objectivity (publicness) of the information upon which such judgments are based are questionable. The process hides both the data considered and criteria or standards used for assessment. Another possible disadvantage is that this approach may encourage "make-believe" sort of activities. Files are likely to be clean and teaching is likely to be well conducted when the inspector is around, but things may as well slacken as soon as he leaves. Another problem relates to the criteria used to select the "expert". What qualifications should he possess in order to be called a "specialist" evaluator? Does Tanzania need people who merely visit educational institutions and just judge or ones who can join the school population and its immediate community with a critical mind to pinpoint weaknesses, report them to the teachers and students and community members who should together with this visitor participate in the improvement of education at that very site? Should we focus on reporting the weaknesses or on how the weaknesses are being or should be identified and rectified?

4. Ascertainment of Value - Decision Making Definition

The following is one recent definition of evaluation suggested by Stufflebeam (1971, p. xxv; 40): Educational evaluation is the process of delineating, obtaining, and providing useful information for judging decision alternatives.

The basis for this definition is to be found in dictionary definitions of its two key terms. Among other definitions, evaluation is defined as the ascertainment of value, and decision, as the act of making up one's mind. The need to make up one's mind connotes the existence of competing alternatives and to select one over the other(s) requires ascertaining their relative values. In other words, the decision to choose comes after the ascertainment of the relative values of the competing alternatives. Hence, evaluation is the process of ascertaining the relative values of competing alternatives. Thus, the key stances in this definition are of separating the concept of "evaluation" from that of "decision making" and the traditional distinction between "evaluator" and "decision maker". While the classification of the two concepts is warranted, the latter distinction needs some scrutiny especially in relation to teaching and learning processes.

The following are some key points regarding this definition[14]:

1. Evaluation is performed in the service of decision making, hence, it should provide information which is useful to decision-makers.
2. Evaluation is a cyclic, continuing process and, therefore, must be implemented through a systematic program.
3. The evaluation process includes the three main steps of delineating, obtaining and providing information. These steps provide the basis for a methodology of evaluation (Stufflebeam *et al*, 1971, Chapter 6).

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[14] Also see Worthen and Sanders (1973, pp. 129-150).

4. The delineating and providing steps in the evaluation process are interface activities requiring collaboration between evaluator and decision-maker, while the obtaining step is largely a technical activity which is executed mainly by the evaluator. Note that this assumption is very important in the consideration of a teacher as a professional evaluator.
5. The evaluative information can be collected through mathematical and statistical means as well as through non-statistical-mathematical ones. Thus the phenomenology that the information describes or relates needs not always be measured in the rigorous sense. So-called intangibles are also eligible for inclusion when required, and if conventional methods of obtaining information does not permit measurement of intangibles, the methodology should be extended to include these "difficult" variables.
6. Evaluative information must satisfy several classes of criteria, some of which must be "scientific" and the values and criteria jointly identified by evaluator and decision-maker[15].
7. Although judging is the central term of this definition of evaluation, the act of judging itself is not central to the evaluator's role.

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[15] See Stufflebeam et al (1971, pp. 27-30; 107-117); Worthen and Sanders (1973, pp. 218-227).

This definition of evaluation and its key terms are summarized below:

Definition: EVALUATION IS THE (1. PROCESS) OF (2. DELINEATING) (3. OBTAINING), AND (4. PROVIDING) (5. USEFUL) (6. INFORMATION) FOR (7. JUDGING) (8. DECISION ALTERNATIVES).

Terms:
1. Process. A particular, continuing and cyclical activity subsuming many methods and involving a number of steps or operations[16].
2. Delineating. Focusing information requirements to be served by evaluation through such steps as specifying, defining and explicating.
3. Obtaining. Making information available through such processes as collecting, organizing, and analyzing, and through such formal means as statistics and measurement.
4. Providing. Fitting information together into systems or subsystems that best serve the purposes of evaluation, and reporting the information to the decision-maker.
5. Useful. Appropriate to predetermined criteria including those which evolved through the interaction of the evaluator and the user of evaluative data.

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[16] Compare this definition of process with a discussion on inquiry process.

6. Information. Descriptive or interpretive data about entities (tangible or intangible) and their relationships, in terms of some purpose.
7. Judging. The act of choosing among the several decision alternatives; the act of decision making. This involves assigning weights in accordance with a specified value framework, criteria to each entity being judged.
8. Decision Alternative. A set of operational responses to a specified decision question.

The advantages and disadvantages of this definition remain to be seen, but the foregoing discussion will implicitly or explicitly try to point out some of its attributes. Generally, however, there is no single definition that is accepted by every educator. One key point to note is that we must first uncover the underlying assumptions of a particular definition of evaluation before it is accepted. Teacher College and University students should be given an opportunity to inquire into evaluation rationales, models and definitions rather than being fed with what others think is true. Students should themselves engage in finding out the nature of what other people fund or advocate.

II. THE GOAL AND ROLES OF EVALUATION

Table 2 summarizes various views on the goal (purpose) of evaluation. It is only in Scriven's column that the term "role" is given an explicit emphasis.

Scriven (1973; 1972) finds that the failure to make the distinction between the goal and roles of evaluation is one factor that has led to the dilution of what is called evaluation to the point where it can no longer answer the questions which are its principal goal. Scriven points out that while evaluation can play many roles in education (such as of teacher training activity or of the process of program development and instruction), the evaluation process has only one functional goal - that of determining the worth or merit of something. It is on this basis that Worthen and Sanders (1973) define evaluation as 'the determination of the worth of the thing. In includes obtaining information for use in judging the worth of a program, product, procedure, or objective, or the potential utility of alternative approaches designed to attain specified objective' (p. 19).

Scriven has emphasized that no study of any program can be labelled as evaluation unless some judgment is made. In other words, values as standards are central consideration in evaluation studies. This point concerns the distinction between evaluator and decision-maker observed above. Scriven has maintained that the evaluator must make the judgment of merit. He regards the evaluator who refuses to engage in decision making as having abrogated his role. Stufflebeam et al (1971) and Stake (1973; 1972) insist that judgments be made by the decision-makers and that the role of the evaluator is only one of facilitating judgment by others rather than rendering judgments himself. Stake argues that the evaluator who does participate in decision making destroys his objectivity and, hence, his utility. Other writers do not describe the relationship of the evaluation study to decision making at all (Worthen and Sanders, 1973, p. 216). However, Stufflebeam (1971) seems to agree that 'In some ways the issue of fusing vis-a-vis separating evaluator and decision-maker (judgmental) role is academic, since in most cases the decision-maker will perforce have to be his own evaluator' (p. 44). And Worthen and Sanders (1973, p. 128) think that the judgment component of evaluation has been alluded to in the "decision-management" strategies, and these writers take Scriven's stance.

The advocates of decision-management strategies of evaluation have placed an emphasis on program description (data collection and storage for use by decision-makers). They have also emphasized the significance of viewing evaluation as a continuous inquiry process, the provision of feedback, and the need to evaluate at both macrocosmic and microcosmic levels rather than merely focusing on the latter. However, the end of the dispute between those who view evaluation as the value judgment that precedes practical decision making and those who view evaluation as involving actual value judgments of decision making process remains to be seen.

Despite the broad conception of evaluation, some assumptions which seem to underly the discussions on evaluation need to be explicated and related to our aims of education for self-reliance. For, if we have to borrow ideas from what others do, we must try hard to discover the purposes for which these ideas were generated. Failure to do this is likely to lead us to wholesale adoption of innovations, some of which may be really antithetical to our intents.

One assumption concerns the distinction between evaluator and decision-maker. Education for self-reliance emphasizes teacher and student involvement in program development and implementation. If the purpose of the schools is to facilitate student learning, the major orientation should then be that which allows student and teacher involvement in matters of program development and implementation. If students together with their teachers and community members have to involve themselves in the generation of goals and objectives, they must as well know about and be responsible for evaluating their intents and the tools they use to achieve them and the consequences of their activities which they themselves plan. In our case, teachers and students should in all circumstances be seen as evaluators as well as decision-makers. The responsibility of national education should be to enable teachers and students become both good evaluators and decision-makers. For purposes of teaching for student learning, however, the distinction between decision-maker and evaluator is likely to hinder rather than facilitate effective teaching and learning. Why?

This distinction partly bases on the philosophy of academic rationalism. In fact, this philosophy has very much influenced the concept of educational evaluation although it is often not directly documented in relation to evaluation in educational discussions. One evidence of this influence is provided by Stufflebeam et al (1971):

> 'In the set of variables identified with instruction, content is that structure or body of knowledge which is identified with the subject matter of the discipline and controls its inquiries. Generally, content is described through a structure of topics to be covered' (p. 243)

Of course, this conception equates content with disciplined knowledge which must be covered by the students. It tells us that the only source of instructional content must be funded knowledge and that evaluation of instruction should judge whether or not disciplined knowledge is being achieved in the form it is "purely" funded by the specialist producer. Such advocacy rules out student involvement in practical experiences of generating knowledge, objectives and instrumental content and in evaluating his products. And evaluation of instruction has not to deal with real life learning situations (direct learning) but with display situations. This also implies that evaluation has always to deal with materials and procedures established by specialists and not with those prepared and/or thought out by students and teachers themselves. Nor does such evaluation consider the use of primary materials or indigenous chunks of the real world environment and other secondary materials which are not produced by specialists and yet are the most authentic and appropriate for teaching and learning than those types of display that are produced by specialists and have to be evaluated by evaluators other than teacher and student and approved by the decision-maker who is also neither a teacher nor a student. But to limit evaluation to the contents of the established disciplines is to reject the key purpose of education that students should learn from the real life situations.

Related to academic rationalism are the top-down mode of program development and profit orientation in evaluation thinking. That evaluation is conceived in terms of evaluating specialist products for "consumer" market is demonstrated by Scriven. In fact, his distinction between formative and summative evaluations seem to have originally been necessitated by the need for promoting profit-oriented projects to produce a compendium of program materials for commercial purposes rather than for direct facilitation of student learning. Profit incentives for developing and selling finished programs to schools are also explicated by Cronbach's (1972) statement that 'Evaluation, used to improve the course while it is still "fluid", contributes more to improvement of education than evaluation used to appraise a product already placed on the market' (p. 64). Cronbach and Scriven seem to have written their papers when the need for establishing student-and-teacher based, non-profit oriented projects had not been operationalized except in minor instances (Miller and Dhand, 1973, pp. 1-7) and, thus, when the top-down mode of program development was still the common practice.

According to Scriven, formative evaluation is one used to improve a program while it is still fluid by providing feedback to the developer. The evaluation feedback loop stays within the developmental agency (its consultants), and serves to improve the product. Summative evaluation is evaluation of a completed product, aimed at the potential consumer. Thus the role of evaluation process which may serve to enable administrators to decide whether the entire finished curriculum, refined by use of the evaluation process in its first role, represents a sufficiently significant advance on the available alternatives to justify the expenses of adoption by a school system. The evaluation here goes outside the production agency and serves to improve utilization or recognition of the product (producer and others) (Worthen and Sanders, 1973, pp. 62-63).

It will be observed shortly that Scriven's formative and summative roles of evaluation can be very usefully applied in an educational orientation which allows student and teacher involvement in program development. They are, of course, useful for believers in top-down mode of program development and producers of school materials for profits. Certainly, schools cannot produce everything they need; we have to buy some materials already prepared by some agency. What is here questioned is the implementation of a finished and predetermined program which has to be followed in accordance to the requirements and truths of the specialist producer and about which the major actors of education - teacher and student - have nothing to change but just receive, cover and be tested by external evaluators. One danger of top-down, profit-oriented, finished programs is that the producer's profit incentives are likely to be so strong that they overwhelm the necessity to directly facilitate student learning. Competition among producers is likely to result in the proliferation of either poor or expensive materials which might be the most used instrumental content in schools because the producer is likely to justify their worth or merit to the decision-maker (not teacher or student) whose decision to adopt any ready-made program to schools has to be accepted by the major actors of education without questioning why.

Thus one assumption that might be associated with evaluative practices predicted on top-down mode of program development and the philosophy of academic rationalism are profit incentives in education. Here, the role of the teacher is to receive finished products and procedures and impose them on the students. The intents of the program are neither teacher's not student's, not even society's as a whole but by and of the private enterpreneur. In our case, however, the production of school materials should never be allowed to be dominated by private interests. It must not be so because education is not a private enterprise. Education should not be allowed to be controlled by money-minded philosophies, for to do so is to use education as a means of stratifying the society and, hence, dehumanizing our teachers and students and the society as a whole. Education means much more than economics. Our organs concerned with the production of educational materials have to allow student and teacher involvement in the production and use of these materials. Schools should be free to use whatever materials are appropriate to the problems teachers and students and community members have identified for investigation. The idea of teaching a finished program is both opposed to the inquiry teaching and learning and is indeed depersonalizing. Doing away with teaching the fixed programs means rejecting evaluation for facilitating wholesale consumption of such products.

Another distinction often made is between the "evaluator" and "evaluated". Believers in top-down mode of program development based on academic rationalism are likely to always treat students and teachers as Out-Theres to be observed and evaluated and to be made to accept that role without questioning why or without asking why they should not also evaluate the "specialist evaluator" and "decision-maker".

Certainly, the public has to evaluate what the school does and how it does it when the need arises. But in our case, such an evaluation must be cooperative. It must involve the educators themselves, the community members, the students, and any other person who is likely to pinpoint the weaknesses. It is this group which must as well be responsible for finding out the ways of improving the situation. It might be aided by other people - individuals, other communities, government officials and the like. Schools must learn how to find out and report their own problems and weaknesses. This means that everyone directly concerned with education must know the process of evaluation. For, they need to evaluate their actions continuously and be as accountable to the public as possible. Of course, this does not preclude a person external to the integrated community to come and see or describe what it is doing. But for such a person to be useful to the community, he needs to facilitate its social action, not just see and describe what it is doing. Evaluation aimed at facilitating student learning through social action cannot assume a distinction between evaluator and evaluated because under such circumstances everyone involved in the action is an evaluator as well as evaluated. Educational evaluation should consist of judgmenets that help the teacher and student better manage the teaching and learning processes so that the learner becomes a better learner about himself and the world around him.

Some Roles of Evaluation for Student Learning

As Scriven points out, evaluation plays many roles. But when most teachers think of evaluation, they think of classroom tests, mid-term or terminal or final examinations, especially the national ones. The data normally obtained from such a test or examination administration consist of scores for individual students. In addition to this, it is possible to determine the percentage of students getting each of the questions right.

Three major roles of evaluation need emphasis. One of these is administrative, dealing with the assignment of grades to students and involves an evaluative judgment of turning new data from a test into a grade. A second role of evaluation involves decisions about the effectiveness of program components in facilitating student learning. This could be equated to Scriven's formative evaluation. A third role of evaluation is the decision made by school systems (teachers, students and others) to adopt or reject the whole course of study or its particular aspects. This role could be equated to Scriven's summative evaluation (Kurfman, 1970(a), pp. 41-10; 1970(b), pp. 355-362).

The most common role of evaluation is grading students. The traditional association of tests, grades, and evaluation tends to put evaluation into the role of facilitating administrative decisions. The grade a student receives from annual or final examination becomes the basis for deciding whether or not he will move from the primary school to the secondary school or from one form to another. Final, national examinations, for example, play an administrative role of deciding whether or not a student will proceed to form one or to form five or to the University (although in this case additional selection criteria have been considered), and to vocational and other professional institutions. Thus, students are put into vocational or academic courses because of the grades they have obtained. Still other administrative decisions, such as entrance into colleges and acceptance in various professions, are based on grades and certificates received in earlier years of schooling. The necessity for such administrative decisions, however, seem to be built into educational systems in many countries. Perhaps it is inherent in any educational system. Could these administrative decisions base on criteria other than final and/or national examinations?

A distinction must be made between day-to-day inquiry exercises students do during classroom transactions and terminal or final examinations, the purpose of which we continue to question. The persistence of terminal examinations is partly related to linearity disadvantage of the congruence definition of evaluation in which evaluation is often seen as the last of a series of tasks or experiences, one that has to give an indication of final success. That evaluation should come after instruction is an assumption that the demonstration of achievement calls for the student to solve a problem in a situation that is different from the conditions under which he developed skill and understanding. The student must apply himself in a new situation. 'Specifically stated evaluation should measure how well a pupil can use information and skill in different situations' (Schomburg and Sheridan, 1970, p. 32).

Schomburg and Sheridan find that support for this idea can be drawn to some extent from educational psychology where theories indicate that a test of learning is what the individual can do with input in a different setting. To what extent has an individual learned about the economic base of cities if he cannot apply his learning to a city that is new to him? Thus, terminal tests or examinations are associated with the inquiry process of application or the principle of transfer. This could also be one assumption underlying unilinear models of program development and instruction.

It may be possible that terminal examinations engage students in application of what they are taught during instruction. But this unilinearity assumes that instruction and evaluation do not necessarily co-exist, that we must first teach and evaluate later, that application of "input" should be performed outside instruction because the classroom transaction is concerned with feeding the input into the student's repertoire and evaluation with the "output" measurement. Instruction is not seen as a situation which could be designed to provide students' opportunity to apply and transfer prior experiences. The new situation is seen as being detached from instruction. All terminal examinations and some classrooms tests or exercises that finalize a unit of study or a lesson assume this unilinearity. Final examinations, however, have not been used for providing feedback to educators for purposes of improving teaching and learning. Some of these examinations that come at the end of a term or year have been administered as a matter of routine, not even for administrative purposes.

Figure 32 indicates that examinations may focus on the assessment of student's ability to do a particular activity or use his physical and mental operations (hypothesizing, appreciating, or generalizing) or may focus on a product of his activity (such as a term paper, a drawing or a student-written booklet). Examinations or tests can be administered under controlled (manipulated) or free conditions. Either of these conditions can take place either in the real world or in the decision environments or in a combination of the two situations. To the writer's knowledge all final and other examinations and tests in geographic education for secondary schools have been done under manipulated conditions, that is, the teacher or some other person outside the school deliberately sets up the stimulus conditions. With the emphasis on exact measurement of student behaviours selected response items have been common, particularly true-false, multiple-choice and matching items. Then are fill-in-items, short-answer items and the essay examination questions the category called constructed-response items (Popham and Baker, 1970, pp. 132-143). All these items focus on the reproduction of "input" under manipulated conditions using indirect situations.

Tests under "free" conditions consist largely of data gathering while the learner has no idea that he is being tested.

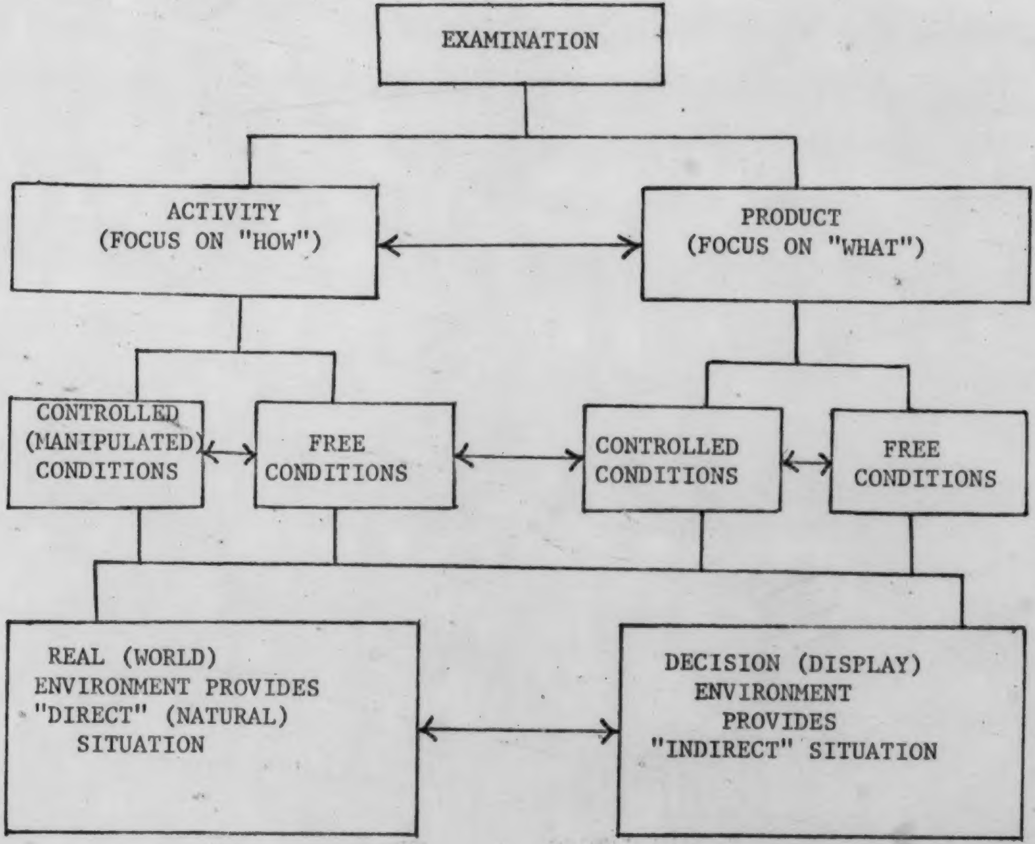
EXAMINATION
ACTIVITY (FOCUS ON "HOW")
PRODUCT (FOCUS ON "WHAT")
CONTROLLED (MANIPULATED) CONDITIONS
FREE CONDITIONS
CONTROLLED CONDITIONS
FREE CONDITIONS
REAL (WORLD) ENVIRONMENT PROVIDES "DIRECT" (NATURAL) SITUATION
DECISION (DISPLAY) ENVIRONMENT PROVIDES "INDIRECT" SITUATION

FIGURE 32. Focus, Conditions and Situations of Examinations. After Popham and Baker (1970, p. 132).

Observations of students working with peers on a school farm, or his cooperative spirit in classroom discussions could be examples of using free assessment conditions. In another sense, however, free condition implies that students undergo free inquiry of some sort either as a field experience or as a library research or as a combination of the two. Of course, such an undertaking is more than mere final examinations or routine classroom tests and could be used for judging the performance of a learner and for administrative purposes.

The product of final examinations are marked examination papers and grades. Do these data provide the feedback for improving student learning? The answer is no; they do not. We may get some generalizations from the analysis of these papers and scores but even these generalizations may be of very little or no help because each class each year has its own peculiarities. Applying generalizations derived from the final examinations done by an earlier group to the new group of students could be assuming that all classes each year were homogenous and static artifacts. Moreover, emphasis on evaluating examination papers (written responses) - which other prople also call products - is an emphasis on evaluating the static and passive components and such an evaluation misses the central idea of guiding and causing student learning in a living human transaction. Even if process data were available, they could only be utilized by the next time around because it would be too late to use them for refinement in the ongoing program.

Do terminal examinations really involve fruitful application of what one has learned? Do they help a student to transfer his learnings to real life situations for purposes of participating in social action? Besides final examinations meaning that learning is over, that education is a terminal process, they seem to correlate with the beliefs of the academic rationalists. For, to them, application means the student's ability to reproduce input (funded knowledge taught) on the examination sheet in an indirect situation. Here, everything the student does is secondary to the real life situations. Application or transfer resulting from such a preoccupation could probably be labelled secondary too. But Tanzania badly needs people who can apply their prior experiences to the real world situations. We need people who have to manipulate real resources available in our cultural ecology to produce real goods and services. The best test for what one knows should be one's ability to identify and solve a real life problem in a real world situation, not merely hypothetical situations. The latter is only a means to an end. The former requires one to engage in real inquiry. The decision environment is merely a product of and man's tool for solving real world problems; as such it is also a means to an end. To the writer this is the essence of President Nyerere's statement that one should value others and be valued by them for what he does and not for what he obtains. One should be able to solve real life problems and thus extend the humanity and freedom of individuals and the society at large. And this is the essence of liberating education. To solve a real life problem is to eradicate constraints which deprive us of freedom and better living. But final examinations are neither a means nor an end to the solution of real life problems or to the real world productive activity.[17] Final examinations have often been defended by being labelled as "motivators", but they only motivate extrinsically and often do not in fact motivate positively but punish students. Since they are terminal, they come so late that they hardly reinforce desired responses. Oftentimes final examinations cause students to develop extreme anxiety and neurotic behaviours or even real madness. Some students who fail examinations often lose friends and self-confidence through being labelled as "failures", suffer from alienation at school and sometimes at home (peers reject them). Society itself tends to reject such students because it treats them as stupid and useless. Yet no normal human being is born without a particular talent which if fully developed, he could be a productive member of the community.

Eisner (1975, p. 6) has rightly identified one universal problem in education. All too often, the major actors of education - teachers as well as students - engage in a kind of role playing that allows each to cope with the expectations in the situation without being changed much by them. Fixed programs ready-made for schools to buy and teach according to fixed procedures or activities are partly responsible for this problem. So are academic rationalists and those monopolists who maximize profits from education. They give the teacher or the student what they demand, and to do it in a way that requires the least expenditure of physic energy and intelligence on their part. Students who are not really captured by the adventure of intellectual thought tend to become the slaves of academic requirements. The key requirement in our secondary schools has been to study funded knowledge for final examinations. Most students come to learn how to meet their expectations for achievement which are defined in relation to the standards, the grades, set by the teachers or someone outside the school. What effort is necessary depends largely on what teachers and others expect and reward.

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[17] For further discussion on the weaknesses of examinations see Kellum (1969, pp. 140-157).

As Eisner (1975) points out, this orientation to school experience is a kind of patient forbearance. And as such it lacks the luster, the spark, the commitment that characterize intrinsically satisfying forms of engagement. Meaningful learning should base on student's interest and capabilities to engage in inquiry.

It is true that teachers, too, have developed skills that allow them to engage in institutional roles without touching the deepest part of themselves or their students in the process. Teachers too have acquired a vast repertoire of copying skills, of reciting, and regurgitating, after a school generation in the classroom. The practice of routinely administering examinations, and of sticking to traditional timetables and providing notes to students to cram for final examinations are part of that repertoire. Thus both the student and the teacher have been conditioned to learn how to measure up to the standards set by others and to practice copying behaviours. To be sure, this blame is neither the teacher's nor student's. This problem in education has been the consequence of those three interrelated factors - top-down mode of program development, academic rationalism, and monopolistic incentives in education. And all these have tended to deprofessionalize, if not depersonalize, the teacher. Any society dedicated to improving education must fight these problems.

Evaluation for Mastery

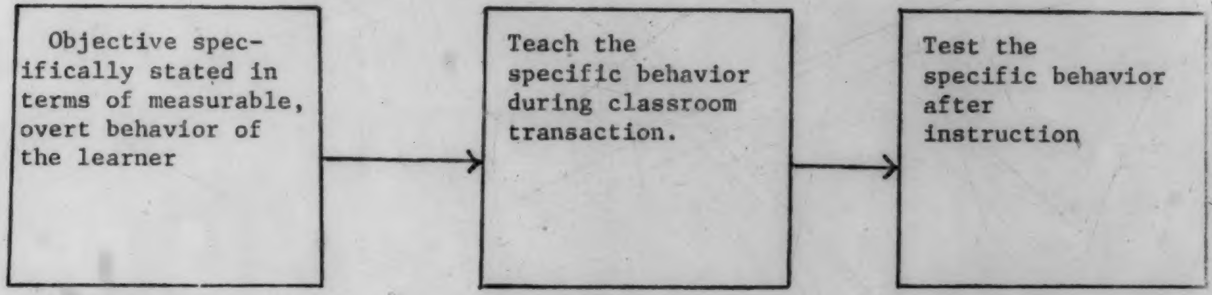
The problem of teaching and evaluating for mastery is a species of the problems of teaching of the testable which in turn stems from the quantitative movement in education. This movement requires teachers to state all instructional objectives in terms of measurable, overt student behaviours. It is in the light of this movement that Popham and Baker (1970) advocate for what they label as "student minimal levels" and "class minimal levels". These writers state:

> 'the teacher must indicate the level of proficiency that he expects of a particular student. For example, if he wants students to perform certain division operations involving three-digit numbers, he ought to state what proportion of the problems on the final examination the student will be able to solve correctly. For example, should he be able to solve 85 percent of the problems correctly? In many cases, the teacher will set a student proficiency level somewhat lower than 100 percent

> to allow for calculation errors, causal oversights, carelessness, and so on' (p. 40). 'In addition to establishing student minimal levels, the teacher ought to describe how well the total class should perform with respect to the objectives. For example, he might indicate that 90 percent of the class ought to perform with at least 80 percent proficiency on the sentence-analysis exercises in the final examination. Or, again, all of the students should be able to recite from memory, with no more than one error, the five-line passages indicated in the text' (p. 41).

This movement has been suggested for and/or accepted in our schools, colleges and university (Lema, 1973, p. 45). It is for this reason that we must know its dangers, some of which were pointed out in previous discussions.

Gronlund (1970, pp. 32-36) distinguishes between teaching and testing at the "minimal essentials level" and teaching and testing at the "development level". Learning outcomes that are considered minimal essentials are typically low-level outcomes that can be rather easily achieved by students and that serve as prerequisites to further learning in the area. Those outcomes at the developmental level represents goals toward which students may show different degrees of progress but which they never fully achieve at any particular time. The ability to understand, to apply, to interpret, and to think critically, for example, typically depend on an extended period of development. For most concepts and skills, there is no limit to human understanding or capability. For example, there can always be increasing understanding of "accessibility" or "cultural relativity". Their complete attainment is not expected in any given course. Popham and Baker and other believers in "the psychometric criterion-referenced/performance based approach to program development and program evaluation" focus on measurable minimum essentials that can be recited from memory exactly in the form they were crammed. The teaching emphasis at the minimum-essentials level is one of shaping and modifying student behaviour to fit a predetermined and clearly defined minimum level of performance. In fact, the objectives are frequently stated as discrete tasks to be performed rather than as intents to work toward. Such simple and clearly defined tasks make it possible to have a one-to-one relationship between the stated objective, the teaching procedures, and the testing procedures. As shown in Figure 33, the measurable, overt objective is stated, the specific behaviour is directly taught, and that very specific behaviour is directly tested.


Objective specifically stated in terms of measurable, overt behavior of the learner
Teach the specific behavior during classroom transaction.
Test the specific behavior after instruction

(For example, to be able to identify five landforms from the map)

(For example, demonstrate and provide practice in identifying five landforms from the map)

(For example, administer a test requiring identifying five landforms from the map).

FIGURE 33. One-to-one Relationship Between Objectives, Instruction and Testing. After Gronlund. (1970, p. 33).

Figure 33 is the model used in programmed learning and in teaching at the training level. It is also the basic unilinear model advocated by Mager (1962), Glaser (1962), Popham and Baker (1970), Thornburg (1973), DeCecco and Crawford (1974) and many others, particularly physchologists. This is the school of thought which preaches mastery. Standards of performance are most frequently specified in the learning of minimum essentials. These standards may indicate that complete or nearly complete mastery is expected. This is the model of the teaching machines.

One implication of criterion-referenced tests based on overt, measurable behaviours is thus to make sure that "input" exactly equals "output". 'In such a situation, the assumption held is, that given goals and objectives, it is merely a technical matter, albeit difficult, to control the instructional situation so that it will be in alignment with the given goal or objective. It is tantamount to believing that we possess the power to control the instructional process and to predict the outcomes with a high degree of certainty' (Aoki, 1974, p. 93). But on what basis does such a program planner decide that a student should list five landforms and not two or ten or all? Why should an educator set a criterion at all before he even knows how the student is going to act during instruction? Why should we educators predetermine and condition students' behaviours by selecting standards that control and engineer teaching and learning processes which are supposed to be democratic and non-mechanitic? Is it not fatal to cause human thinking proceed in the manner the machines work, the gadgets which man has himself discovered?

Teachers quite commonly require that students master some body of information in order to get an "A" and they then assign lower grades for varying percentages of mastery. According to the norms of distribution, a group of students is awarded scores such that five percent gets an "A", another five percent gets an "F" (fail), a "B" and a "D" form twenty percent each, and fifty percent of students score a "C". Does this practice have any utility in a socialist, democratic society which is based on human freedom of thought and action? That the myth of normal distributions must be discarded is supported by many educators who have worked toward personalization of man.

Schools all over the world have emphasized skills of reading, writing, speaking and counting. To do well in schools requires that students be able to demonstrate their achievement in the spoken, written or quantitative statement. As Eisner (1975) states, the use of the written, quantitative and spoken symbols is of course of great importance in making one's way in the world. 'But as important as these abilities are, they are not the only means through which we represent both internally and externally what we know, believe or value. The human's ability to construct reality takes a wide variety of forms, only some of which are couched in the written word. What men know surely exceeds what they can say. What one is able to conceive of is not limited to what one can define in linguistic terms alone. Our conceptions and our awareness exceeds our speech' (p. 8). And some reasons supporting Eisner's insightful stipulation were pointed out earlier. Even the phonetic and phonemic transcriptions which linguists use to approximate more the real meaning of human utterances do not fully represent man's conception and consciousness of reality. The problem is not these representations per se, but the limited and marginal way in which non-linguistic and non-quantitative competencies are regarded in school programs by advocates of objectives stated in measurable, overt student's behaviours and by academic rationalists. Being good in school is seen as being able to demonstrate competency through the written word at the end of instruction. And even there the level of proficiency is often more concerned with the artless than with the artful. True, as Eisner (1975) stipulates, one sickness in education is that of parochializing our conception of human ability and with the narrowness of the avenues available for human performance. The commitment to teaching of the testable is tantamount to teaching of the trivial for purposes of measurement which implies 'using highly restricted tests that structure the gateways to educational and social mobility' (Eisner, 1975, p. 9).

The idea that students can achieve mastery or some percentage of mastery has been transferred to other learning objectives for which it has little or no applicability. It may be a useful idea if the goal of the program is to develop specific transfer of training, but with more complex objectives such as understanding and appreciating, there is no clearly established point of mastery. Failure to recognize the developmental aspect of human experience, failure to recognize and give the richness of the human mind its full reward, is most likely to lead us to a very parochial conception of education. We need to look for humane ways by which our young people can develop and display their talents to their fullest potentials. However, this will hardly be realized through emphasis on control tactics built into the use of criterion-referenced tests, normal distribution curves, final examinations, beliefs in academic rationalism, top-down mode of program development and implementation, and limiting educational evaluation to the administrative roles.

As a continuous, cylcic inquiry process, evaluation must be built into a naturally ongoing educational program aimed at facilitating student learning. Evaluation should be seen as an inherent part of the learning process itself; it should be a student's experience as well as a teacher's teaching technique. Evaluation may serve many roles, but some of them are either peripheral to or entirely useless for facilitating student learning. Evaluation aimed at justifying the implementation a finished, fixed and given programs which can be bought as kits to be superimposed on teachers and students is in fact an evaluative role which is antithetical to the facilitation of student learning. But evaluation to indicate how relevant a particular material or procedure can facilitate student learning is aimed at freeing the human mind and his activity. Students and teachers must be free to evaluate and choose any tool which is appropriate to the problems they intend to solve. In inquiry teaching and learning, predetermined arrangements are prohibitive to student learning. For, what freedom of inquiry does a student have if he cannot identify his own problem, hypothesize, test it by using any available evidence, reach his own conclusion and apply it in any different situation? Finished and purchasable programs mean that a specialist producer has done the thinking for a teacher and the student and what they need to do is merely to go through the footsteps of the specialist designer. Is this freedom of inquiry?

Inquiry teaching-and-learning process which begins with a question rather than an answer must abandon final and mid-term examinations because an inquiry experience necessarily calls for continuous evaluative judgments of the worth or merit of procedures and materials used in the instructional transactions. Here the teacher is continuously judging student's progress. Evaluation becomes his teaching technique rather than something to be done at the end of instruction. Moreover, instruction has no end. A piece of prior instruction necessarily connects with the new one and with other prior instructions. Instruction is not uni-linear but cyclic process too. Instruction is a spiral, developmental activity. In inquiry teaching and learning, students, with or without the gudance of the teacher, individually or in groups, have to engage in formulating and evaluating evaluative standards and procedures - the sort of evaluation labelled by Scriven (1972) as meta-evaluation or evaluation of evaluation. Teachers must be able to perform such an evaluation so that they are able to select appropriate materials and techniques together with their students. Here, there is no fixed set of materials that an external evaluator has to specifically demand to evaluate. He may see teachers, students and other community members in action either within or outside the school gates. He may be shown their plans for future action and their achievements. He may look at the products of the integrated community - its shops, farms, workshops, booklets, survey instruments, new way of growing and using sorghum and cassava and the like. But with inquiry teaching and learning aimed at social action, our external evaluator will not expect to evaluate predetermined, purchasable programs or particular materials and procedures. There will be no fixed set of objectives stated in terms of student's overt, measurable behaviours which have to be analyzed as outcomes in examination papers. Instead he may be asked by the actors of social action to show them the avenues to improving what they might be doing or intending to do. They will demand service from others - their evaluations and decisions included - at the point of social action, not after things have failed. Intents will be theirs, not of a visitor.

With inquiry teaching and learning, our programs will always remain fluid. Our list of problems and intents will be in continuous revision. In the beginning of the year we may set to investigate agricultural problems, but specific problems are likely to change in tune with changes in the real environment within and outside Tanzania. And this is one real nature of man; he changes his goals and objectives, problems and procedures in accordance with the real life situations. Man is in continuous and dynamic quest for the meaning of things, for solutions of present and future problems. As such, teaching and learning cannot be entirely systematic; it is also unsystematic, spontaneous, and unpredictable. The emphasis here made is that students should engage in the solution of real world problems by using whatever knowledge is relevant for solving these problems. And evaluation should aid such an educational focus rather than evaluating for the sake of teaching and learning funded knowledge. The traditional rewards - the percentages and letters - given for writing final and mid-term examinations, are most likely to jeopardize students' and teachers' pride for their own accomplishments. Moreover, in real life situations, (parents rewarding their children, for example) we do not reward and be rewarded by numbers and letters.

The best reward one can get from the act of learning is the satisfaction for knowing and using something to solve a problem. The solution to a problem is to the writer the best and natural human reward and motivator. And this cannot be reduced to numbers and letters which in fact eventually become the goal and objective for teaching and learning.

Formative and summative evaluations could typically become teacher's activities and student's inquiry experiences. Formative evaluation might lead to decisions by teacher and students to revise or reformulate their plans, activities and instructional content. It might as well be used for evaluating the tools for social action. In an integrated community such tools have to be evaluated by all those involved in the action - their books and other sources of information, hoes, ploughs, offices, stores, and the like.

Teachers might of course collect data for assessing the prerequisite capabilities and interests of individual students before a certain instruction or investigation begins. Such information could then be used to reselect and reorder instructional plans to avoid actions that are beyond their capability or learnings that are not needed because students already know what is intended. But such an assessment is often necessary when the teacher does not know his class properly. It is likely to be helpful with a new class or when beginning a new problem. It should be undertaken for a particular reason, not as a matter of routine.

Teachers and students should also involve in summative evaluation, for they need to be able to accept or select whatever instructional content is appropriate to their inquiry. The educational service centers suggested earlier might provide an opportunity for teachers and students to contribute their thoughts and their products beyond what takes place at school and the immediate community.

One problem we also need to look at in relation to evaluation is a time factor which also concerns the way social action has to be undertaken. This problem is expressed in the "Education for Self-Reliance" thus:

> 'One difficulty in the way of this kind of reorganization is the present examination system; if pupils spend more of their time on learning to do practical work, and on contributing to their own upkeep and the development of the community, they will not be able to take the present kind of examinations - at least within the same time period. It is, however, difficult to see why the present examination system should be regarded as sacrosanct. Other countries are moving away from this method of selection and either abandoning examinations altogether' (Nyerere, 1968. p. 288).

Musoma resolution has also pointed out the sacrosanctity of examinations.

If we emphasize inquiry teaching-and-learning which focuses on real life learning rather than display learning, time will no longer be a constraint in evaluation. Moreover, inquiry needs time.

That final examinations should be abandoned completely in favour of alternative ways of selecting students for further education is here fully documented. One basis for selecting students would be continuous and comprehensive records of students' attitudes, values, and their day-to-day engagement in conducting an independent or shared inquiry. And this is why the concept of inquiry has been discussed at length in this study. Students might be selected on the basis of their abilities to solve real life problems by using whatever tool is available to them, funded knowledge being just one such tool. This implies that students should really be taught how to conduct inuqiry; they should be given freedom to inquire. Without this freedom of thought and action, inquiry will be the poorest basis for selecting students for further education. Another way of having students proceed for further education would be to allow an individual learner to study for what he thinks is competent about. This would require not choice of disciplines but of particular problems or themes.

More natural situations and free conditions of collecting data on student's attitudes and values should be utilized. Some literature exists on the debate on the utility of the controlled experiments in evaluation (Stufflebeam, 1971, pp. 23-23; Glass, 1971, pp. 3-17; Worthen and Sanders, 1973, pp. 220-245; 26-39). This dispute is, however, left for the reader himself to probe into.

But the writer's belief is that evaluative data about human attitudes and values and even cognition are most likely to approximate more the real nature of man if these data are collected in an uncontrolled condition. In fact, even ethnography, a non-statistically oriented method used by anthropologists to study cultures (Shaver and Larkin, 1973) is not likely to avail evaluative data which is absolutely free from distortions of the real nature of man. Yet, it might be a useful evaluative method of collecting data about human transactions and actions.

Regarding ethnographical method and in contrast to statistical ones, the techniques for collecting data are more open-ended. The ethnographer does not operate from a set of fixed and predetermined arrangements. Instead, his 'open searching for unanticipated relationships between persons and systems are well suited to the identification of important variables and their antecedents and consequences' (Shaver and Larkin, 1973, p. 1257). This suggests that more direct observations and descriptions of what students do in free conditions and natural situations would be more recommendable than preoccupation with control techniques. It is possible that the more the human mind is observed in a "tight" or controlled situation, the more what is humane in him deviates from his humane behaviour. If the evaluative condition and situation are artificial in nature, the observed behaviour is as well likely to become artificial and unrealistic. Whether or not control experiments result in data that are about the humane behaviour of man is an issue that needs extended research.

Admittedly, however, this discussion on evaluation has dealt with a very narrow range of problems but which the writer believes are central to the aims of education for self-reliance. Should this discussion be able to trigger one's mind to ask more questions about educational evaluation, it will have served its purpose.

CONCLUSION

The aim of this study has been to suggest a conceptual framework which could establish an understanding of the relationship between the aims of education for self-reliance, the principles of program development, and the field of geography. This was necessitated by the awareness that the major constraint in our educational system has been the lack of establishing this relationship among the three variables by the participants in program development and implementation. Upon using the suggested scheme to examine the illustrative problems identified in this study, a number of understandings and generalizations have been reached.

The major source of instructional content for geographic education in our secondary schools has been disciplined or funded knowledge. This preoccupation has tended to encourage book-learning or information learning rather than process and affective learning. Future programs need to draw instructional content from both real world and decision environments. The extent to which instructional content will be generated from either of these sources ought to base on suitable and explicit selection criteria. Although some selection criteria have been suggested, their range is not fixed, and some may even become obsolete. Others will evolve out of the action. Any list of selection criteria must continuously be reappraised in accordance with new developments. So are organizational criteria. The criteria for selecting and organizing instructional content and activities illustrate the need to base our program priorities on sound judgment of our educational deliberations.

The philosophy of academic rationalism and top-down mode of program development and implementation seem to have been among the major problems which have hindered educational change. These factors have been very antithetical to our aims of education for self-reliance. They have tended to encourage information learning, to discourage process and affective learning and practical and direct learning. They have hindered the effective integration of the school with the community. They are responsible for the persistence of meaningless examinations and teaching geography and possibly other disciplines for knowledge's sake. They have thus deprived teachers and students the opportunity to learn by doing, to initiate and experiment innovations, to actively and intelligently involve in program development and in the creation of knowledge and production of real goods and services. Academic rationalism and top-down mode of program development are among the consequences of the practices of the colonial past. For us to realize our educational aims and meaningful change in our educational system these two factors have to be given a special treatment not only in secondary education but in all sub-systems of national education. We need also to guard against the economic, psychological and other factors which tend to encourage mechanistic education, and especially the philosophies or rationales and models which might dehumanize man. Students and teachers have to engage in practical and direct learning through inquiry directed at social action. Teachers and students ought to engage in inquiry itself.

As inquirers, the major actors of education will have to some degree question the obsolete and irrelevant aspects of conventional wisdom as well as funded knowledge about teaching from the past and to establish a new awareness of phenomena in accordance with a new environment. They ought to be the inveterate tacticians seeking alternatives to ascribed norms which militate against creativity and freedom in education, especially freedom of thought and action.

Teachers have to see no simple formulas for good teaching and learning. Recognizing the essentially personal, humane nature of the teaching-learning relationship, of the primary relationship between teacher and student, the educator will only prescribe to the extent of saying that good teaching must encompass diverse techniques, styles, skills and purposes, but like good research, it will require sound intelligence. The choices we will make among alternatives will have to be made consciously in the light of the self-knowledge that they are compatible with the environmental realities. They have to be relevant to social change aspired to. And this social change and natural growth 'must come out of our own roots, not through the grafting onto those roots of something which is alien to our society. We shall draw sustenance from universal human ideas and from the practical experiences of other peoples; but we will start from a full acceptance of our African-ness and a belief that in our own past there is very much which is useful for our future' (Nyerere, 1968, pp. 315-16).

To successfully teach by inquiry strategy, the teacher will have to believe that the teacher-training of the past, for all educational levels, has been inadequate to the needs and problems of the present and future. Educators ought to develop teaching behaviours which are not narrowly predetermined by tradition but which will allow them not to stupidly reject all that is traditional. We need to be genuinely enthusiastic and skillful inquirers, experimenters with our own as well as with student learning. One of our goals should be to imbue our students with the urge to propose and test ideas and we should realize, as should our students, the hypocrisy of not practicing what one preaches.

Although educators and learners have to be enthusiastic about experimentation and change, they should not be faddists. We should not unwittingly make changes and accept gimmicks just to be different; we should not be sham innovators. We need to approach ideas with skepticism and tentativeness, but not of a kind that paralyzes us, for we will work as inquirers, checking with logic, evidence, and probability. We have to be skillful investigators consciously bringing to bear on our classes our research skills and attitudes for the purpose of improving teaching and learning. We need to be challenged by teaching because we should view it as a process of continual problem solving. We should be continuously mulling over questions of teaching and learning, posing hypotheses, seeking and checking data to test our hypotheses and come to meaningful conclusions. We should not only want to know what elements of our teaching succeed or do not succeed, but also why we get these results. Our performance should make the tired debate about the "dichotomy" between teaching-learning process and research seem ever more hollow. Educators should be learners, consciously developing and testing theory, skills, and methods for learning. It is the educators' and students' engagement in this process of inquiry that will be their greatest source of professional and vocational satisfaction. It is this process upon which teachers' and students' performance has to be evaluated. Terminal or final examinations have tended to hinder inquiry teaching and learning and, hence, the satisfaction that is supposed to derive from inquiry process. As eager learners, teachers and students have to set learning about teaching at the top of their list of priorities.

As cooperative inquirers, teachers need to reach outward to students and colleagues to test their own ideas and of others and to find new ones. They should devote time and energy to weigh ideas about teaching and learning from whatever source is relevant to their inquiry. And this needs a consideration of the traditional timetables which tend to rigidly structure a school's day and cause teaching and learning to become mechanistic processes. We require to be in close communication, sharing ideas and materials with one another in various segments of the natural experiences. The educational service centers suggested previously are likely to aid this cooperative endeavour. An inquiring teacher will not have to guard his classroom as his personal fortress as though he were a king who needs answers only to himself. He should welcome, indeed urge, being held accountable for effective teaching and he should work hard at developing techniques which will ensure the use of meaningful criteria for responsible evaluation of teaching and learning.

While knowledgeable about our geographic subject matter, our skepticism and tentativeness should apply also to the subject matter itself. As inquiring teachers we should not automatically genuflect to geographers or hold as significant for our teaching all that passes as geography. In choosing what to teach, we, as our students, need to work hard at trying to separate the relevant from the irrelevant, the superficial from the fundamental. Our students should play an important role in this process. We must know that human enterprises, geography included, have their share of sham and genuineness, of brilliance and dullness, of doctrine and dynamism, of creators and charlatans, both conscious and unconscious. If we cannot find significant content for our teaching in the work of geographers, we have to search elsewhere. We should tend to be irrelevent about disciplinary boundaries. Attuned to the dissonance from the increasing rate of knowledge decay, teachers and students should often be in a quandary about what to teach and learn, and our program content should always be fluid and flux. A teacher should, of course, make careful plans for facilitating students' experiences but he should not cling tenaciously to them as though they were somehow sacrosanct. The ends of such a plan should arise and function within teaching-and-learning activities. Its objectives should be seen as tentative, flux and evolving from action rather than determined by someone else outside the teaching-and-learning experience.

The free and open inquiry in our classes need often go in unpredictable directions and into uncharted ground. The unintended consequences of our deliberations have to be seen as desirable and will form the basis for planning the new experience. We have often to build today's surprises into tomorrow's lesson, a process which yields a constantly evolving subject matter and techniques. Creative teaching does more than transmit knowledge - it generates it.

An inquiring teacher will strive in his teaching for creative synthesis between knowing and the ways of knowing, which is a process of having his students both learn the content of the subject matter and learn how to learn. Subject matter *per se* is not the measure of significance for his students; rather it is the process of content matter as taught. Subject matter and process are strongly interdependent; they co-exist. But the degree of subject matter learning is strongly dependent on how well process learning is accomplished. This necessitates different teaching techniques, materials, and experiences, classroom climate and even new physical environment.

The teacher will not be apt to rely heavily on conventional texts and standardized syllabi or purchasable programs, but rather will be continuously at work assessing and collecting teaching materials from a wide range of sources, as well as creating them himself and the students. The use of real world environment as a source of instructional content and as a teaching-and-learning situation has to be emphasized.

It should not be the teacher's purpose, nor will it fulfill his personal needs, to demonstrate to his students that he knows his subject matter well. For, there is no necessary relationship between telling students what he knows and student learning. The teacher should be much more prone to ask challenging questions than to give answers, and to direct his teaching at involving students in the process of inquiry. He should not view students as empty receptacles into which he is to pour "his" knowledge. His premise should be that students bring to his classes a wealth of knowledge and feeling that he may somehow help to enhance and develop. Acquisition of information per se should be abandoned in favour of having students generate knowledge by use of their own minds. Learning how to better find information should rank higher, and the ability to use it in the conceptual work of problem solving and decision-making should rank higher still.

To have students take the major share of responsibility for their own learning and for teaching their fellow students, and to have students learn more about how to work effectively with others and thus learn more about themselves, are other equally important objectives the teacher and students should hold. The teacher should be able to state his objectives to his students and encourage them to state their own, to try to develop base-points against which to guage their learning. Through inquiry teaching and learning, the possible discrepancy between teacher's objectives and students' objectives will be minimized or completely eradicated.

The teacher should view himself as a facilitator of learning rather than as the resident authority figure and expert. In his class, students should be encouraged to challenge ideas, including his own. The measure of worth of an idea should not be first and foremost the source from whence it comes, whether from the teacher, a textbook, students, or whatever, but it should be rather whether or not it stands the test of logic and evidence. And evidence need not always be of a concrete, objective nature. Much of the richness in human experience involves values, attitudes and feelings. Such so-called subjective evidence should be legitimized and encouraged in his classes. In inquiry teaching and learning, the teacher need not try to hide his own values and feelings or to avoid ethical questions, not because he seeks to indoctrinate with his own views, but because he believes that students and himself can and should develop in affective as well as cognitive learning. His feelings and values, like those of the students, should be known to the students on the premise that all of the affective components should be subject to thoughtful criticism, particularly with reference to their sources and past and probably future manifestations.

Teachers should find it crucial to have students take a great deal of personal responsibility for their own learning. Our students should be encouraged to participate in discussions and decisions about course objectives, structure, procedures, learning materials and experiences, and in evaluating both of their own learning and of the quality of instruction which teachers are responsible to provide. We teachers have to trust our students to learn, and this way, they will also trust us to facilitate their learning; more often than not, this is in fact what should happen because our classes have to operate on the basis of intensive communication, cooperation, genuineness, experimentation, personal responsibility, freedom of inquiry and open critical thought, and mutual support and respect. These qualities will teach confidence and self-knowledge, as well as the concepts of the subject matter. They will provide support for human beings faced with risks inherent in change.

Lack of educational research and studies in our educational system is another problem of significance. There is a need for us to engage in various types of research and studies in both applied and basic domains, and the results of which should provide some avenues to further understanding of the nature of our educational problems and the basis for improvement and growth. Despite the lip service given to conceptual studies in education, they must as well be encouraged if we are to understand the models, ideas and concepts we are using or we will learn from what others do and believe. Research needs to be directed at all facets of educational deliberations, but most needed seem to be the one focusing on program development and implementation - research aimed at the facilitation of student learning.

Lack of educational research means that it is we Tanzanian educators who have to engage in this task. It is our problem and we must solve it ourselves. Research has to be undertaken by people who experience and perceive our educational problems. We have to abandon the lingering belief that teachers and students are so busy that they cannot conduct a meaningful research. Research is indeed an inherent activity of teaching-and-learning process. It is what this process should be all about. As such every educational program must include research methodology as instructional content. To be reconsidered is the belief that "outsiders" or "experts" will always come to research for us and give us an answer and eventually leave sometimes with data and equipment. We ourselves have to use what others do and what we do in order to begin with a genuine problem and come up with our own answer. To use other people's solutions to their problems, to use ready-made answers, someone else's truths, without deliberate tests of their validity is most likely to put us in a very desperate position.

Future improvement of educational deliberation ought, as Eisner (1975) puts it, to 'start not with a pie in the sky image for a nameless and faceless population but that it should be created in relation to genuine circumstances; in the cauldron of activity' (p. 12). Such an approach to the future of our schools 'promises not a dogma of virtues or a recipe for the perfect school, but rather grows out of the recognized gap between is and ought. It develops out of the application of educational connoisseurship to educational situations' (p. 12). As Eisner (1975) suggests, given the premises that there is no single educational program that is good for all students, in all places, forever, responsible educational planning in the present requires assessment, discussion, deliberation, articulation of alternatives forecasting of unanticipated consequences, appraisal of costs in relation to benefits, and the like. Three aspects identified by Eisner regarding this process are in the writer's opinion very relevant to education for self-reliance. The first is what he terms ~~as~~ educational connoisseurship, the second is educational criticism, the third deals with the construction of compelling models of educational virtue.

Connoisseurship consists in being able to first perceive and then being able on the basis of such perception to make judgments about what one has perceived. The connoisseurs perceive subleties that escape others, they see relationships that are not obvious, they apply recollections of similar events or objects and compare the present one with those encountered in the past. They detect nuances and make subtle perceptual distinctions.

Criticism is the art of thought which what has been experienced can be rendered. Its end is the re-education of perception. Criticism is concerned with using language in such a way that the qualities that constitute an object or event, and the character of the experience undergone in their encounter, is made vivid so that others having less connoisseurship than the critic are able to encounter the object or event more completely. To perform the act of criticism requires the construction and use of metaphorical language that discloses the qualitative import of what is going on.

Metaphor enables us to express the ineffable - it suggests or renders rather than describes. It penetrates the surface of qualities to illuminate their expressive content, their experiential meaning. Criticism becomes the bridge over which the product of conoisseurship are shared. The latter without the former is private; the former without the latter is empty. We need both in order to know what we have in our schools. Their products provide the raw materials for deliberation.

The program model suggested in this study, may be used as both analytical and operation tool for understanding our educational problems and for program development and instruction. However, as Eisner (1975) points out, educational planning, because of its complexity and the social consequences of such planning, needs to guard against the application of simplistic models for purposes of analysis. It is in the deliberative process that a range of models should come into play. Since what we choose to be salient in our deliberations is shaped to a large degree by the models to which we are committed and to those we have learned to use, we must use them simply to organize our perceptions and to make sense out of our experiences. 'Models, like theories, are the nets we cast in order to catch. Our problems arise when we take our models to be the avenues to truth' (Eisner, 1975, p. 14). To have the clearest understanding of our educational problems and their effective solutions, our educational deliberation should utilize a variety of models and particularly those predicted on the basis of actuality. But no model should in any way be seen as representing absolute truth. One immediate research would be an investigation and appraisal of the models we are now using in teaching and learning.

For the application of connoisseurship, the use of educational criticism and the application of alternative models for analyzing educational problems to yield the forms of educational practice that makes educational progress possible, we require the exercise of imagination, the articulation of educational possibilities that are at once appropriate for some population and context. These educational possibilities should not simply be the product of naivety nor ignorance of the past. Much of what is offered as new today is old medicine in the new bottles. We need some vision of educational forms of schooling that we can embrace and which aim at making man more humane and productive.

All of the above - the ideas in this study - are by no means complete; they should never be. These ideas are in the real world and decision environments; they are in the mind, in the professional and general literature, in conferences and workshops, in the private conversations by students and educators, in the homes, offices and public places. The discussion centers on the demands of our philosophy of education and some of our past and present problems of teaching and learning geographic education for self-reliance. Some of these ideas might have already been obsolete and irrelevant to our situations. They need careful analysis. They form the basis for further discussion and investigation. But the operationalization of education for self-reliance requires all the citizens of Tanzania, and particularly teachers and students to think beyond the traditional practices of program development and implementation. One key means to successful educational change is open inquiry and an individual's opportunity to exercise freedom of thought and action directed at humanizing man. Future improvement of our geographic education for self-reliance is demanding in that it calls on the part of educators and learners and others to think hard and work hard. And this is what we should do. Educational improvement is not impossible. As President Nyerere (1968) says, IT CAN BE DONE, PLAY YOUR PART.

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APPENDIX I

SYLLABUS OF INSTRUCTION FOR AFRICAN SCHOOLS

SECONDARY

1947

GEOGRAPHY

STANDARD V

(a) Home Geography - A study of the types of country surrounding the school; observing climate, vegetation, and crops commonly grown. This will enable the children to understand simple geographic terms in English.

(b) British East Africa - With special reference to Tanganyika Territory; studied under the following heads: physical features, climate, vegetation and occupations.

(c) Africa - Main physical features and main political divisions. East Africa in relation to the African continent.

(d) In this class the main compass directions should be learned in English and simple plans of the school and district made in connection with section (a) - but not necessarily to scale.

STANDARD VI

The atlas should be studied carefully in order to learn the following points:

(a) The main continents and countries of the world with special reference to the position of Africa in relation to the rest of the world.

(b) The oceans of the world.

(c) World communications - sea and air and the main trans-continental railways.

(d) Special reference should be made to the countries of the British Empire.

(e) The main divisions of Africa referring to their exports and imports.

STANDARD VII

(a) Regional geography should begin here - the following twelve major world regions should be studied:-

(1) equatorial region;
(2) tropical region;
(3) hot deserts;
(4) Mediterranean region;
(5) Monsoon;
(6) temperate deserts;
(7) warm temperate oceanic;
(8) cool temperate oceanic;
(9) temperate continental (grassland)
(10) cold temperate (coniferous forests);
(11) tundra and ice deserts;
(12) Alpine.

These regions should be studied under the following heads:-

(1) Climate;
(2) Vegetation;
(3) Animals;
(4) Position;

(b) A regional study of North America under the following heads:-

(1) The continent - extent, coastline and general features;
(2) Physical divisions;
(3) Climatic regions;
(4) Vegetation regions;
(5) A regional study of the following political divisions:-
    (a) Canada;
    (b) U.S.A. and Alaska;
    (c) Central America and West Indies.

Each political division will be studied under the following heads: physical features, climate, vegetation, agriculture, animals, minerals, populations, cities, and towns, industries, commerce, with a brief reference to customs and history.

(c) Elementary astronomy: the earth as part of the solar system - movements of the earth - influence of the sun and moon - eclipses - latitude, longitude and time.

STANDARD VIII

Euro-Asia (not in detail):

(a) The British Isles and Europe studied under the following heads:-

(1) Physical features (including main rivers);
(2) Climatic regions;
(3) Vegetation regions;
(4) The countries of Europe including the British Isles - main towns and occupations.

(b) Asia: studied generally under the following heads:-

(1) Physical features (including main rivers);
(2) Climatic regions;
(3) Vegetation regions;

(N.B. - A detailed study of these continents comes later).

(c) The earth's surface: denudation; transportation; deposition; types of mountains - fold, residual, peneplain, rift valleys, volcanoes; types of lakes, types of rocks and soil.

STANDARD IX

(a) A regional study of the countries of Asia:-

(1) India and Burma;
(2) Ceylon;
(3) Indo-China, Siam, French Indo-China;
(4) Malaya;
(5) East Indies;
(6) The Chinese Republic;
(7) Japan;
(8) Siberia and Russian Turkistan;
(9) Afghanistan, Persia, Turkey, Iraq, Arabia, Palestine and Syria.

(Each division should be studied under the following heads: physical features, climate, vegetation, animals, minerals, population, cities, industries, commerce - with a brief reference to customs and history).

(b) Map making:

(1) Map projection;
(2) Scales - R.F., diagonal scales, construction of lineal scales;
(3) Principles of triangulation and traversing - without details of trigonometry.

(A simple road traverse with prismatic compass should be carried out as a practical illustration of map making).

(4) Contours.

STANDARD X

(a) The southern continents:-

(1) South America;
(2) Australia;
(3) Africa (general - a detailed study comes later).

(Sections (1) and (2) should be studied under the heads as in the study of Asia (see Standard IX). Section (3) should be studied under the following heads:-

(i) Position and size;
(ii) Physical features, drainage -rivers and river basins;
(iii) Climate - especially effect of ocean currents;
(iv) Vegetation and forestry).

(b) A short course of Climatology:-

(1) The air;
(2) Pressure;
(3) Temperature;
(4) Winds.

(c) A short course of Oceanography:-

(1) The ocean floor;
(2) Movements of the ocean - waves, currents, tides;
(3) Effects of the sun and moon on tides, etc.

STANDARD XI

(a) The division of Africa in detail;

(b) The divisions of Europe in detail;

(These sections should be studied under the heads as set out in the study of Asia for Standard IX).

(c) A short course of Human Geography:-

(1) Human life - development and distribution;
(2) Classification of man;
(3) Stages in development of the human race;
(4) Human life in the various regions;
(5) Areas of concentration and the development of towns;
(6) Geographical boundaries;
(7) Occupations of civilized man - agriculture, mining, industry;
(8) World distribution - preparation of data and statistics.

(d) A short course of geology and minerals.

STANDARD XII

This is left to the discretion of those concerned. It leaves time for revision and further practice in answering questions of all kinds.

SUGGESTED BOOK LIST

(a) For Students:

THE WORLD - Stamp.
THE WORLD - Stembridge.
Any good Atlas.
THE OXFORD SKETCH MAP OF WORLD GEOGRAPHY - Stembridge.
CLARENDON GEOGRAPHY - PART I PRINCIPLES - F.D. Herbertson.
PHYSICAL GEOGRAPHY AND GEOLOGY - Stamp (optional).

(b) For Staff:

THE PRINCIPLES OF GEOGRAPHY - PHYSICAL AND HUMAN - E.G. Skeat.
MAP WORK - V. Seymour Bryant and T. H. Hughes.
PHYSICAL ELEMENTS OF GEOGRAPHY - Fingh and Trewatha.

CLIMATE - Kendrew.
GEOGRAPHY IN SCHOOL - James Fairgrieve.
GEOGRAPHY AND WORLD POWER - James Fairgrieve.
THE GEOGRAPHY OF PLANTS - Hardy.
ANIMAL GEOGRAPHY - Newbigin.
THE UNIVERSITY GEOGRAPHICAL SERIES - Stamp (relevant parts, especially Africa).

No books have been mentioned for use in Standards V or VI. These are left to the discretion of those concerned.

PROVISIONAL SYLLABUS OF INSTRUCTION
FOR SECONDARY SCHOOLS
1955
GEOGRAPHY

Throughout, references are to the numbered paragraphs in the appended "notes on Syllabus and Recommendations on Methods of Instruction".

STANDARD IX

A. - STUDY OF MAJOR WORLD REGIONS.

1. Equatorial Region.
2. Tropical Region (including Monsoon and Savannah lands).
3. Hot deserts.
4. Mediterranean Region.
5. Warm Temperate Region (East Coast Climate).
6. Cool Temperate Oceanic Region (West Coast Climate).
7. Continental grasslands and deserts.
8. Cold Temperate Region (Coniferous Forests).
9. Tundra and ice-deserts.
10. Alpine or high mountain.

Each of the above regions to be studied in detail under the following five headings:-

1. Position (including Latitude and Longitude and relation to neighbouring major world regions).
2. Climate.
3. Natural Vegetation and Animals.
4. Distribution and density of population.
5. Occupations.

B. STUDY OF ASIA (WITH SPECIAL REFERENCE TO S.E. ASIA) AND STUDY OF AUSTRALIA AND NEW ZEALAND.

Study to be made under the following six headings:-

1. Position and size (including Latitude and Longitude and relation to neighbouring countries and to the rest of the world).
2. Physical features (See Note 1).
3. Climate.
4. Natural Vegetation.
5. Natural Resources, Industries, Agriculture, Trade, Commerce, Communications.
6. Historical development of each area together with the growth of its chief towns. (See Notes 2, 3 and 4).

C. - ELEMENTARY CONTOUR WORK.

The drawing of scaled contour maps and cross-sections of simple, individual features. Methods of expressing scales.

STANDARD X

A. - A DETAILED STUDY OF AFRICA AS A WHOLE. (See Note 5).

1. Introduction on the explorers and the discovery and opening-up of the Continent. (See Note 3).

2. Study of Africa to be continued under the same six headings as for Part B of the Standard IX Syllabus.

B. - A BRIEF STUDY OF THE BRITISH ISLES AND EUROPE. (See Notes 3 and 5).

Study to follow the same six headings as for Part B of Standard IX Syllabus.

C. - CONTOUR WORK.

The Drawing and interpretation of more complex contour maps.

STANDARD XI

A. - A STUDY OF NORTH AND SOUTH AMERICA. (See Note 3).

Study to follow the same six headings as for Part B of Standard IX Syllabus.

B. - PHYSICAL GEOGRAPHY. (See Note 11).

1. Types of rocks and soil.
2. Types of major land forms.
3. Agents of denudation, transportation and deposition.
4. Types of lakes and islands.
5. Volcanoes.
6. Currents and tides (omitting theories of the tides).

C. - DETAILED STUDY OF CLIMATIC FACTORS. (See Note 7).

1. Temperature.
2. Pressure and winds.
3. Rainfall.

D. - CONTOUR WORK. (See Note 8).

1. Continuation of drawing and interpretation of contour maps.
2. Principles of Triangulation.
3. Simple road traverses.
4. Gradients.
5. Enlarging and reducing of maps.
6. Instruction in the theory and use of the prismatic compass and simple clinometer.

STANDARD XII.

A. - A DETAILED STUDY OF EAST AFRICA (KENYA, TANGANYIKA, UGANDA, ZANZIBAR).

Study to follow the same six headings as for Part B of Standard IX Syllabus. (See Note 3). Under heading 6 (that is, the historical development of each area together with the growth of its chief towns) special reference should be made to:-

(a) The coming of the different races (Negro, Hamitic, Bantu, Arabian, European, Indian, and so on, to East Africa.)

(b) The possible lines of future development in communications, natural resources, industries and agriculture. (See Note 9).

B. - STUDY OF THE ELEMENTS OF WORLD HUMAN GEOGRAPHY (See Note 10).

Study to cover the following headings:-

1. Human occupations and activities in relation to physical conditions.

2. Human occupations and activities in relation to the distribution of the major resources in cultivated vegetation, animals, power and minerals.

3. The distribution of population and the growth of great cities.

4. The chief communications by sea, land and air.

C. - PHYSICAL GEOGRAPHY. (See Note 11).

1. The earth as a planet in relation to the sun.
2. Latitude, Longitude and Time.

D. - CONTOUR WORK.

Drawing and interpretation of maps to be continued, in conjunction with and closely related to the study of East Africa.

NOTES ON SYLLABUS AND RECOMMENDATIONS ON METHODS OF INSTRUCTION.

1. The study of the physical features of the continents and countries covered in Standard IX and Standard X should include reference to examples of types of major land forms which are found in the continents or countries concerned. A brief explanation in each case will suffice as an introduction to the more detailed study of the major land forms which comes in Standard XI.

2. The study of the historical development and growth of the chief towns of Asia covered in Standard IX should include references to the complex racial and religious problems of Asia (for example in India) and to the growth of religious centres, that is, Mecca.

3. Throughout the syllabus the study of historical development will be closely allied to the History Syllabus, and it is therefore essential that the Geography teacher when dealing with this part of the syllabus, should consult and work closely with the History teacher in order to avoid omission or needless repetition of matter.

4. It is essential that there should be a close liaison between the Geography teacher and teachers of other subjects which correlate with Geography.

5. In Standard X it should be noted that the study of Africa as a whole is detailed and that the study of the British Isles and Europe is brief. The British Isles is of greater importance than the rest of Europe. Slightly longer should be spent on studying the British Isles. General reference only need be made in Europe to major physical features, broad climatic divisions, major industrial areas and large cities, and to only the most important countries, for example, France, Germany, Italy, Russia. It is important, in dealing with the British Isles and Europe, that the trade, cultural and political links with Africa should be stressed.

6. From Standard IX onwards particular emphasis should be placed on pupils drawing neat quick accurate freehand sketch maps containing the information required, but omitting all unnecessary detail. They should be taught the use of coloured pencils to emphasize detail on maps and the necessity for tidy lettering. They should also be taught how relevant sketch maps may be incorporated in written answers and how they are often a time saving substitute for lengthy descriptions. Monographs or mapads have their uses in saving time, but it is stressed that they should not replace original, freehand drawing of sketch maps by the pupils.

7. Readings of local rainfall, temperature and wind direction commenced in the Middle Schools should continue throughout the course. This should be extended in Standard XI to include humidity and air pressure measurement.

8. The drawing of contour maps should have been thoroughly mastered in Standard IX and Standard X: in Standard XI pupils should be introduced to further principles of map-making in order that they may enlarge their knowledge and understanding of maps, and be better equipped to interpret them successfully.

It is quite practicable to make cheaply and quickly improvised instruments to show the theory of the prismatic compass and the theodolite. Explanations as to how to make these are to be found in many text and reference books such as Hogben's "mathematics for the Million".

Schools near a branch of the Survey Department can doubtless arrange for a lecture or two on the theory and use of the prismatic compass and theodolite.

9. In Standard XII information concerning the possible lines of future development of East Africa should be sought in newspapers, magazines and various Government publications all of which contain articles on present and prospective future development. The information thus gathered will provide useful material for discussions and written exercises.

10. Pupils entering Standard XII should already have most of the necessary facts for Part B of the Syllabus (The Study of the Elements of World Human Geography). In this year therefore it should usually be necessary only to correlate these facts and to draw conclusions from them in order to compare and contrast human activities in various parts of the world and to cover the remaining ground in Part B of Standard XII Syllabus.

It is suggested that this work of correlation may be adequately dealt with by written answers, serving also for revision.

11. Under Part C (Physical Geography) of the Standard XII Syllabus time must be allowed also for revision of the work already done in Standard XI(B) and for the test questions. It is suggested that the teacher should also give a very brief introduction to Geology with special reference to local areas.

12. The Standard XII Syllabus as a whole has been planned to provide plenty of time for revision and for discussion and instruction and practice in individual research work.

13. It should be noted that the use of the words "Climatology" and "Oceanography" has been deliberately avoided in the syllabus. This is because the work covered on climate and oceans is in any case elementary, and it is not considered desirable to give the pupil the idea that there are some separate and complex branches of Science for study.

14. The use of film strips and other visual aids such as the geographical wall pictures published by Macmillan is considered to be essential in teaching geography. The knowledge of distant lands and communities which can be gained from text book descriptions alone is limited and unreal. Film strip libraries are referred to in the History syllabus on page 98.

COURSE BOOKS

Any suitable text book which covers the requirements of the syllabus can be used in class. Suggested minimum requirements for such a text book are:

> systematic arrangement; clear, well-proportioned, interesting presentation of material; abundant illustrations of geographical points; maps and diagrams giving minimum detail and fixing attention on points to be emphasized; literary rather than colloquial style of writing; test questions and exercises; good index. Since the pupil will sooner or later have to familiarize himself with technical terms, it is desirable that such terms should be used in the book, but the comment made in the fourth paragraph of the Introduction applies particularly to Geography.

The following are among those suitable:-

GEOGRAPHY FOR TODAY SERIES (St. IX-XII) - Stamp and Suggate. (Longmans).

BOOK II. THE SOURTERN CONTINENTS.
BOOK III. NORTH AMERICA AND ASIA.
BOOK IV. EUROPE AND THE BRITISH ISLES.
BOOK V. THE WORLD.

REAL GEOGRAPHY, Bks. 1-6 (St. IX-XII) - Fairgrieve and Young (Philips).
AFRICA (Regional Geography Pt. II) (St. XII) - Beaver and Stamp. (Longmans).
AFRICA (St. XII) - Suggate. (Longmans).
THE WORLD (St. IX-XII) - Stembridge. (O.U.P.).
THE WORLD (St. IX-XII) - Stamp. (Longmans).
ELEMENTARY MAP READING (St. IX-X) - Pickles. (Dent).
MAP READING (St. X-XII) - Pickles (Dent).
CONTOURS (St. IX-X) - Boxhall and Devereux. (Philips).

See also Geography books in Reference Library List on page 14.

GEOGRAPHY ROOM

It is desirable, wherever possible, that there should be a separate Geography Room in the Secondary School; it should in character approach more nearly to a laboratory and handwork room than to the older type of classroom with desks. Features suggested are:-

(i) Flat tables for group work and map work which can be arranged in the classroom in rows when desired. Details should depend on the size of the room, but 7 ft. 6 in. by 2 ft. 6 in. is a suitable size which would seat three for ordinary working, so ten tables would be required if the room is large enough.

(ii) Side benches 2 ft. 6 in. high along one side of the wall are useful, and on the other side glazed cases with drawers for museum specimens. These would be for (a) geological specimens, (b) economic products, (c) maps and documents of historical and geographic interest, etc.

(iii) Raised demonstration bench (gas and water provided if convenient).

(iv) Sliding blackboards if possible, hanging frames for maps, soft boards on side walls for maps and picture displays. A board for weather records.

(v) Arrangements for using film strip projector and epidiascope - screen and projection point. Means for darkening the room without interfering duly with ventilation are necessary - possibly jalousies.

(vi) A large sand tray in the centre of the side bench so that it is available immediately to illustrate points of relief, etc. is useful.

(vii) One or two cupboards at the end of the room for storage of apparatus.

(viii) Apparatus should include printed map globe and state globe (which may be suspended). Barometer (suited to altitude), wall thermometers, maximum and minimum and wet and dry bulbs. (These are useful even if duplicated in a Stevenson's screen outside).

THE UNITED REPUBLIC OF TANZANIA

PROVISIONAL GEOGRAPHY SYLLABUS FOR FORMS 1-4

1973

I. THE OBJECTIVES

To prepare the pupil for service to this country by:

(i) Making him aware of his immediate environment.
(ii) Helping him to acquire the appropriate attitudes and skills with which to interpret and develop that environment, including those of recording, analyzing and synthesizing the observations that have been made.
(iii) Helping him to acquire knowledge and understanding of the relevant aspects of the larger environment in which the community and the country exist by selecting topics of particular applicability to his studies and to the environment in which he lives.

II. CONTENT

SECTION A Map and Photograph, Interpretation

Map reading and interpretation based on a contoured survey map extract of part of East Africa. Interpretation of a photogrpahy from an area in East Africa.

SECTION B East Africa: (Kenya, Tanzania and Uganda)

Pupils will be expected to study East Africa with special reference to recent developments in these countries and to the geographical factors influencing developments. These studies should be made through field studies of local areas and sample studies of other areas in East Africa. Candidates will be expected to have made at least one field or sample study to exemplify each of the major aspects of development and each of the major geographical regions of East Africa. The study of East Africa should include:

(a) The distribution of population in relation to resources and environment.
(b) The major landforms, their modes of formation, and the agencies modifying them including: Main types of rocks; earthquakes; faulting; plateaus; vulcanicity; weathering and the formation of soils;

processes and results of erosion and deposition by running water; processes and results of coastal erosion and deposition (including coral); lakes.

(c) The elements of weather. The characteristics of climate and vegetation.

(d) Characteristics of Agricultural development including small holdings, large scale and parastatal farming, irrigation, water supply and control, pastoralism, soil erosion and conservation.

(e) Characteristics of mining and industrial development.

(f) Fishing.

(g) The development of towns and posts.

(h) The development of tourism including conservation of wild life.

(i) Patterns of internal and external trade and communications.

SECTION C THE REST OF AFRICA

Africa and its political units. Its major landforms, the agencies modifying them and their influence on human activity. Characteristics of and factors affecting climate, vegetation and distribution of population. Pupils will be expected to have studied specific geographic areas that illustrate different types of development.

(a) The Changes from Subsistence to a Market Economy:

For example, Cocoa farming in Ghana: Palm oil in Nigeria.

(b) Large-scale Agriculture:

For example, Rubber in Liberia: Sugar in Natal.

(c) Large-scale Irrigation:

(d) Multi-Purpose Scheme in River Development:

For example, Kariba, Volta, Aswan.

(e) Pastoralism:

For example, Cattle in Northern Nigeria: Sheep in South Africa.

(f) Use and Development of Forest Resources:

For example, Swaziland; Ivory Coast; Algeria.

(g) Mining Industry:

For example, Copper Belt of Zambia; Petroleum in Algeria.

(h) Other Industrial Development:

For example, Lower Egypt; Accra - Tema complex.

(i) Urban Development:

For example, Cape Town; Ibadan; Addis Ababa.

(j) Transport Development:

For example, Communications for Zambia; Transport in the Congo (Kinshasa).

(k) Development of Trade:

For example, Mon-culture in Gambia; Marketing Problems of Cocoa.

NOTE: The examples given in this section are intended solely as a guide to teachers in interpreting the syllabus and are not meant to be exclusive.

SECTION D STUDIES OF DEVELOPMENT

Two of the major regions listed below should be studied with reference to:-

Agricultural and industrial development including the response to Social Organization.

Major features of relief and drainage and their influence on human activity.

Characteristics of and factors affecting climate, vegetation and distribution of population.

Within each region pupils will be expected to make a series of studies in depth based on those listed below. For each of these studies they are expected to have a knowledge of the characteristics of human development and its relationship with physical environment, and an understanding of the factors aiding and the problem facing development.

Pupils should be able to relate regional studies of climate, vegetation and population to world maps showing climate and vegetation regions and population densities.

THE REGIONS

1. North America with particular reference to:-

   (a) The Cotton Belt: a changing agricultural landscape and a growing industrial area.
   (b) Southern California: the development of commercial agriculture and associated industries in a semi-arid landscape.
   (c) Canadian Prairies: extensive farming and early stage of industrial development.
   (d) Great Lakes and the St. Lawrence Seaway: an industrual region based on mineral and water resources and ease of communications.
   (e) Chicago: a metropolitan study.
   (f) Tennessee Valley Authority: multi-purpose river utilization.
   (g) New England: a well established agricultural and industrial landscape.

2. THE RHINE LANDS

For purposes of this syllabus, the Rhine Lands will include: The BENELUZ countries, The Ruhr; The Rhine gorge and Rift Valley and the adjacent highlands; Switzerland. Special reference should be made to the following:-

   (a) Switzerland: farming, industry and tourism. A highly developed economy in a landlocked country with limited physical resources.
   (b) Ruhr industrial region.
   (c) Rift Valley: farming and industrial development.
   (d) The Rhine delta region: land reclamation. Dutch dairy farming.
   (e) The Rhine Valley as an international routeway.
   (f) Rotterdam and Europoort as international ports.

3. CHINA with particular reference to:-

   (a) Agricultural communes in the great plane of North China and the Sikieng Valley: Social and agricultural organizations; relation of crops to environment.
   (b) Trade patterns including the use of Hong Kong as an entrepot.
   (c) Manchuria: study of large scale industry.
   (d) Development of scattered small scale industry.

(e) Characteristics of an urban area: Peking.
(f) The Yangtse River: study of a river basin development.
(g) Yucan: Study of problems of remoteness.

III. EXAMINATION:

There will be two papers, each of 2 and one-quarter hours duration which includes time for reading. Candidates should bring Mathematical Instruments for these papers.
Slide Rules and Mathematical tables may be used. Candidates will be tested on their ability to use geographical skills as well as their geographical knowledge of the regions set for study. Candidates will be expected to be able to interpret photographs depicting both physical and human features, and represent or interpret geographic statistics. They will also be expected to understand field work techniques and to have studied a local area in the field. Questions involving the testing of geographical skills may be set in any section of the paper.

PAPER I.

This paper will cover Section C and Section D of the Syllabus. Candidates will be expected to answer two questions from Section C and two questions from Section D. In Section D no more than one question may be answered from any one region.

In Section C give questions will be set. In Section D, three questions will be set on each region making a total of nine questions in this section. Questions involving comparison between the regions and East Africa may be set.

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1973

Candidates will be expected in answering their questions to apply knowledge and experience through field work based on the school or home district and through other forms of personal observation. Questions will be set to encourage them to use their knowledge.

Candidates must offer all three papers: Paper 1, Paper 2 and Paper 3.

Paper 1 ($2^1/2$ hours)

Candidates will be expected to answer four questions, at least two being taken from Section A and one from Section B. A wide choice of questions will be set in each section.

SECTION A

General characteristics and distribution of continents and oceans, the general characteristics of rocks, their structures and their weathering in relation to relief. Land forms resulting from Volcanicity. Rivers and drainage systems and related land forms. Land forms resulting from ice and frost action. Land forms in dry climates. Sea coasts including coral coasts. Evidence of elevation and depression.

SECTION B

Characteristics and movements of the Ocean waters as they affect climate. The atmosphere: pressure, winds, temperature, humidity and precipitation. Study of the weather based on simple observation and measurements. The characteristics and distribution of climates and of 'natural' vegetation: formation, erosion and conservation of soil.

Paper 2 ($2^1/2$ hours).

Candidates will be required to answer four questions including at least one question from Section B.

Section A

Africa, South of the Sahara.

Section B

Part 1 - Western Europe, including France, Belgium, The Netherlands, British Isles, Sweden, Denmark, Norway, Germany, Switzerland, Luxembourg.

Part 2 - North America (U.S.A. and Canada)

The regional work should include:-

1) The physical geography of the selected areas and the interrelationship of human and physical geography in the areas chosen.

2) The human geography of the selected areas, including the geographical study of population, rural settlement and colonization; types of farming and agrarian systems; sources of fuel and power, mining, forestry and fishing; manufacturing, industry and the growth of industrial areas; communication; urban geography, the problems of regional division and identification. Topics in the human geography of the selected areas should be placed in the context of the relevant branches of systematic geography.

3) The geographical context of political, economic and social problems.

Representation of geographical data in maps and diagrams. Representation of topographical features on maps. Uses and limitations of the climate and other distributional maps in atlases. Scales and profiles. Simple map-making by means of chain, compass, plane table.

a) Chain - Description and use of chain equipment (excluding the optical square). Field-work in simple chain survey including:-

(i) use of offsets,
(ii) overcoming obstructions to chaining,
(iii) fixing the boundaries, (for example, of building dense woods, water bodies), knowledge of booking and plotting chain surveys.

b) Compass - Description and use of the prismatic compass. Fieldwork in compass sketching and traversing. Booking and plotting (including graphical adjustment).

c) Plane Table - Description and use of plane table equipment. Field work in plane table survey:-

(i) from a point (radiation)
(ii) from a base line (intersection)
(iii) along a simple traverse. The use, but not the proof, of resection in plane table survey.

Questions will not necessarily be set on all topics mentioned in the syllabus. Candidates will be expected to answer question I and any other question. The compulsory question will normally be based on a large-scale map and will be a test of map reading, and interpretation. Of the other questions, one may consist of map interpretation based on the map provided for the compulsory test, but of a more advanced character than the compulsory question.

Note on the use of examples in answering questions:

Wherever appropriate, reference to specific examples should be made by candidates answering questions: These examples may be either those derived from the study of suitable text-books or may be local examples which have been studied at first hand by the candidate, perhaps in his home area under the direction of his geography teacher or in areas covered by field studies. The examples which are used should be carefully integrated with the answer, and should be used to illustrate or qualify general points which are made. A list of examples put together in a haphazard manner and not organized into an argument is of little value.